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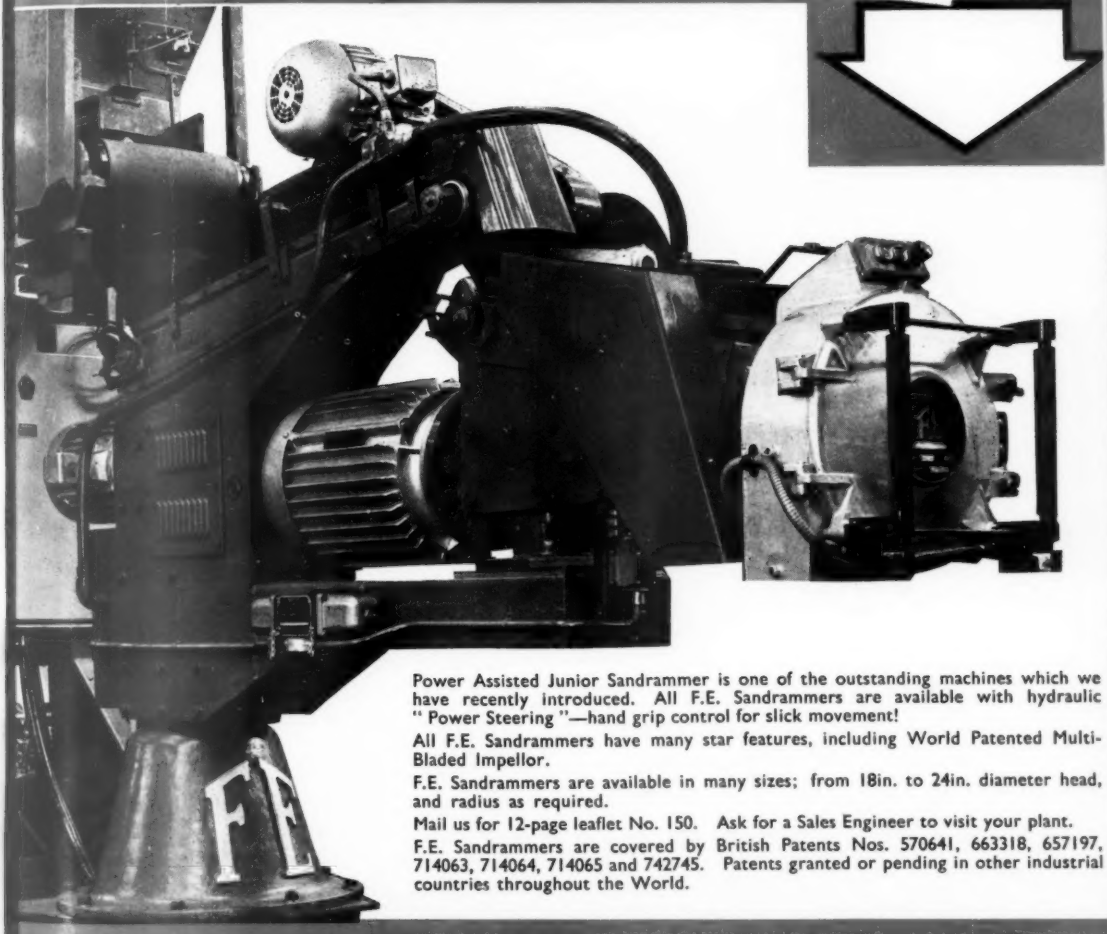

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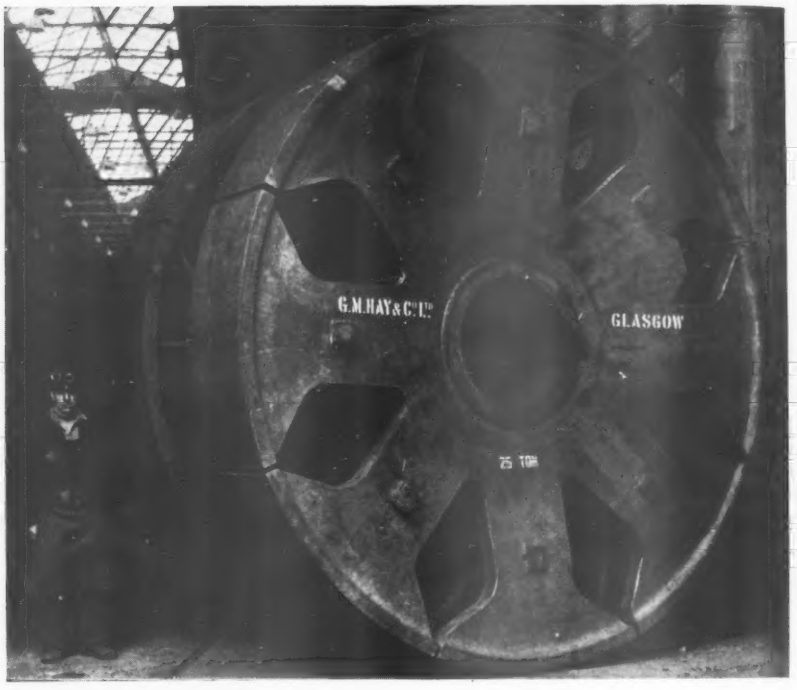

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FOUNDRY
TRADE JOURNAL
Vol. 106 MARCH 19, 1959 No. 2214

Attention, all Copper-alloy Founders!

Elsewhere in this issue, we print a statement issued by the British Bronze and Brass Ingot Manufacturers' Association, which gives their views on the Draft British Standard—revision of BS 1400—now in the hands of interested parties for comment. Because of the great importance of the changes mooted, every copper-base-alloy founder should procure a copy of the Draft, carefully study its implications, and register his comments. Everybody desires an improvement in the properties to be specified, for the dual objectives of keeping abreast with metallurgical progress and aligning British specifications with comparable overseas specifications. This matter is of national economic importance, as the ingot-makers export a third of their output—a fact which seems to suggest that overseas users are satisfied with existing conditions.

In the view of the BBBIMA, the draft specifications for phosphor-bronzes and gunmetals are unrealistic, because of the proposed maximum content of 0·01 per cent. of aluminium, as they believe there exists no reliable method of chemical analysis, even on a referee basis, which can accurately determine such small amounts. Even if they delivered ingots to the proposed specification, the melting processes in the foundry might cause a pick-up of aluminium, and it would then be the founders' job to meet the required conditions. Thus, if these low limits were accepted, it would seem desirable, if not essential, for founders to have laboratory facilities available. For the ingot makers, meeting the proposed new conditions would obviously increase manufacturing costs, and to avoid bankruptcy they would have to pass on these increases to founders.

The proposed alterations to BS 1400 will probably be more acceptable to the larger concerns—which normally have excellent laboratory and control facilities—than the smaller establishments. The sole objective in drawing attention to these proposed changes is to ensure that the British Standards Institution should receive comment from as wide a field as possible. Everybody is well satisfied that due to the scrupulous attention given by the BSI, the published specifications will embody the considered wishes of the major interested parties, *i.e.*, both maker and user. (Comments have to be in the hands of the Institution before April 13).

Correspondence

HALF-MAN SIZE AGAIN?

To the Editor of the FOUNDRY TRADE JOURNAL.

SIR,—Talking one day to a furnaceman of many years' experience, I was very surprised to hear him say that his foundry had got a new furnace, which, though small, would bring down more iron, at a greater speed. He went on to say how very difficult it was to turn round when patching the new furnace—and by the way, he is a very small man!

Is it the fault of the manufacturers of the new furnace, that it is too small inside, or the management's fault for not troubling to consider the man who has to work this fine new model with its quick delivery of iron?

Should a man take shrinking pills, when he is to stand up in the furnace?

Progress, maybe, but think of the man inside!

H. R. BRANDOM.

Luton, Bedfordshire.

[Recently (March 5 issue), the JOURNAL carried a correspondence item reporting that a cupola could now be charged by half a man! Now it seems his other half could usefully be employed for patching a very small furnace! Seriously though, this problem of how to patch small-diameter units effectively is worth consideration by manufacturers. Not always, however, is it their responsibility, as quite frequently foundrymen line down their furnaces below the standard diameter in order to reduce the melting rate. Heaven forbid, that the industry should resort to the employment of "chimney boys"; has any reader a better solution to offer?—EDITOR.]

National and Midland Ironfounders' Association

At the annual meeting of the National and Midland Ironfounders' Association, held on March 11, at the Midland Hotel, Birmingham, under the chairmanship of Mr. J. W. Gardom, the following officers were elected: As president—Mr. W. H. Thursfield (succeeding Mr. Gardom, who was made immediate past-chairman and thus became a member of the Executive); as chairman—Mr. W. James, and as deputy chairman—Mr. E. Hunter. As Trustees, Mr. Thursfield and Mr. James were re-elected as was also the secretary (Mr. L. H. Cleaver). In the ballot for members of the Executive Council, Mr. E. Hanks, Mr. E. C. Marsland, Mr. W. R. Purdy, Mr. K. E. Shenton, Mr. G. H. Stennet and Mr. G. E. Lunt were chosen. Mr. L. H. Cleaver was re-elected as secretary of the Association, and the auditors were also re-elected. The meeting was subsequently addressed by Mr. H. Woods (HM Deputy Chief Inspector of Factories) on the subject of "Health and Safety in Foundries." [A report on some of the topics raised by Mr. Woods and other details of the meeting will be printed in next week's JOURNAL.]

ABBF Apprentice Competition

The Association of Bronze & Brass Founders are organizing a London and Home Counties area apprentices' competition and members are accordingly invited to enter apprentices in their employment. For the practical test, patterns and cores will be supplied for each candidate who will make the casting in his own foundry under supervision to ensure that it is his own unaided effort. It is hoped that the written test and judging of castings will take place at the Borough Polytechnic in the week commencing April 6.

Forthcoming Events

MARCH 23

Association of Bronze & Brass Founders

Lancashire and Cheshire area:—Meeting principally for discussion of the proposed revisions to BS. 1,400:1948, commencing 4.45 p.m., in the Stephenson Room, Engineers' Club, Manchester.

MARCH 23 to 25

University of Birmingham

Series of lectures dealing with basic principles, practice and developments in cupola melting, to be held in the University's Industrial Metallurgy Department, Edgbaston.

MARCH 24

Combustion Engineering Association

Southern region:—10.30 a.m., "Costing of Heat and Power," by G. H. Buckle; 2.30 p.m., "Capital Investment and Fuel-saving Schemes," by R. H. Potterill. Meeting to be held at the St. Ermins Hotel, Westminster, London, S.W.1.

MARCH 25

Association of Bronze & Brass Founders

Yorkshire area:—Discussion of current activities commencing 12 noon. After luncheon, Mr. G. H. Charsley will speak on apprentice recruitment and training. Meeting to be held at the George Hotel, Huddersfield.

Institute of British Foundrymen

London branch:—"Some Aspects of Small Foundry Practice," by F. P. Robinson, 7.30 p.m., at the Constitutional Club, Northumberland Avenue, W.C.2.

Birmingham branch:—"Planning, Production and Progress," by W. L. Beasley and H. D. Adey, 7.15 p.m., at the James Watt Memorial Institute, Great Charles Street.

MARCH 26

Association of Bronze & Brass Founders

Scottish area:—Meeting to be held at the St. Enoch Hotel, Glasgow, commencing 12 noon. Matters to be discussed will include the proposed revisions to BS. 1400:1948.

Institution of Plant Engineers

Sheffield and district branch:—"Refractories," by T. R. Lynam, 7.30 p.m., at the Grand Hotel, Sheffield.

Institute of Metals

Sheffield local section:—"The Nimonic Alloys," by W. Betteridge, B.SC., PH.D., 7.30 p.m., in the Engineering Lecture Theatre, The University, St. George's Square.

Institution of Production Engineers

Rochester and district graduate section:—"Casting Design with Particular Reference to High-duty Irons," by D. F. Knight, 7.30 p.m., at the Old Palace, Maidstone.

BCIRA Course on Effective Reading

The British Cast Iron Research Association has organized a short course on effective reading which will be held at the Connaught Rooms, Great Queen Street, Kingsway, London, W.C.2, from the afternoon of Wednesday, April 15, to the afternoon of Friday, April 17. Mr. J. B. Barclay, assistant director of the Department of Extra-Mural Studies at the University of Edinburgh, will be in charge of the course.

The course will be of a practical nature, the object being to improve individual reading speeds whilst retaining, or even improving, the degree of comprehension. Experience based on longer courses has shown that while the increase in reading speeds varies with individuals, some increase is attained in almost every case, particularly when the results are considered in conjunction with those of the comprehension tests.

The course is limited to 25 to 30 persons and the fee, which includes luncheon at the Connaught Rooms on April 16 and 17, and other refreshments, is £12 12s. 0d. Applications should be made to Mr. G. R. Woodward, manager, Intelligence Department, the British Cast Iron Research Association, Alvechurch, Birmingham.

Effect of a Metal Stream on the Inner Surface of a Sand Mould*

(*Slightly Abridged*)

By Prof. J. Szreniawski

The various effects which a metal stream has on the inner surfaces of a mould during pouring have been investigated. These effects are dealt with under three main headings: Impact—Rinsing—Heat Radiation. The experimental moulds which were used to study these effects are described and illustrated, and the experimental methods used dealt with in detail. Using the results obtained from this research, an attempt has been made to classify moulding materials which are in current use in foundries into grades of "surface durability."

When filling a mould with liquid metal a series of phenomena of chemical and physical character are encountered, and it is very difficult to contain these in a hypothetical frame or law on account of the many variable factors. The effect of the liquid metal on the interior of the mould is, in the first instance, a consequence of the effect of kinetic and thermic energy released by the impact of the metal stream on the mould. Both energies have a destructive effect, directly or indirectly, on the inner mould surface. The heat exchange between the liquid metal and the mould creates an unstable temperature field, which in turn gives rise to physico-chemical phenomena, causing changes in the surface layer of the mould. The consequences of the changes taking place in the mould depend, above all, on the kind of moulding material and its condition, and also on the metal that fills the mould. At the present time sand-moulding materials are chosen by their technological properties, measured by AFS and similar standards.

Surface Durability

It is of utmost importance to maintain the inner surface of the mould undamaged—until the beginning of metal solidification and skin formation—in order to avoid surface defects on the rough casting. Observations made over a period of many years, and a comparison of results of laboratory research with those obtained in practice, have led to the idea of expressing the resistance of the mould surface to the destructive effect of the metal stream as the "maximum time in seconds," at the end of which the rough casting surface still does not show any defects caused by alterations of the surface layer of the inner surface of the mould. This maximum time in seconds has been called "surface durability" and designated with the letter D in this article.

In the progress of this investigation it has been found that the metal stream acts in three different ways, namely, by impact, by rinsing action and by heat radiation. In consequence three main destructive effects develop:—(*a*) Impact on the mould surface; (*b*) rinsing of the mould surface, and (*c*) heat radiation on the mould surface. It has to be mentioned, however, that these three effects act simultaneously, thus complicating the problem to a high degree.

Types of Experimental Moulds Chosen

In order to illustrate "surface durability" three types of experimental moulds, marked A, B and C, were chosen to correspond with the above-mentioned three typical actions of the metal stream.

Experimental Mould A (Fig. 1).—In this case it is presumed that the metal stream falls vertically on the flat, static, mould surface.

Experimental Mould B (Fig. 2).—Here it is presumed that the metal stream, being under pressure in an enclosed passage, rinses a flat, horizontal, and static mould surface.

Experimental Mould C (Fig. 3).—It is presumed here that the metal stream has the shape of a liquid metal surface, and that a mould surface (above and parallel to the liquid metal surface) is exposed to heat radiation from the metal stream.

Definition of "Surface Durability."—The surface durability D of *ordinary* moulds will be designated by an index a, b or c, in accordance with the kind of metal stream described previously, *e.g.* D_a, D_b or D_c. The surface durability D of the three *experimental* moulds A, B and C will be indicated accordingly by D_A, D_B or D_C. The main factors which affect surface durability during the casting operation are:—(1) The geometrical parameters of the mould; (2) type and condition of the moulding sand; (3) type and temperature of the metal; (4) condition of the mould surface; (5) heat conductivity and heat-absorption capacity of the mould; (6) gating technique and linear speed of the metal stream, and (7) smoothness of the mould surface.

Definition of Impact and Rinsing Action.—In the case of impact of the metal stream, the geometrical parameters of the mould influence the *dynamic pressure P* of the liquid metal on the mould surface. In the case of a rinsing stream, however, the parameters influence the degree of turbulence, as expressed by the Reynold's number, Re. The two values P and Re subsequently influence the surface

* Paper read at the International Foundry Congress, 1958, at Liège; abridged translation prepared by Dr. O. P. Einerl. The Author holds the chair of the metals technology department of the Lodz Polytechnic Poland).

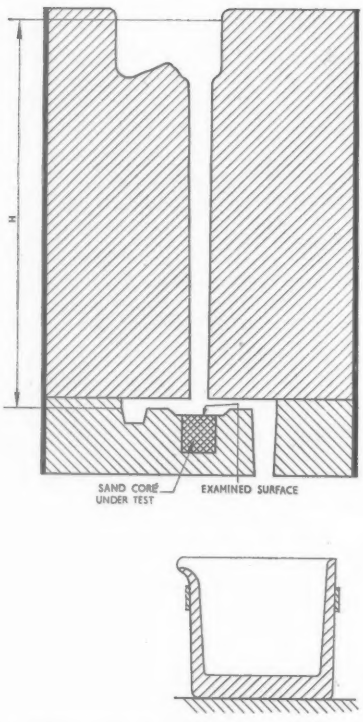


FIG. 1.—*Experimental mould A, used in the study of the "Impact" effect.*

durability of D_a and D_b of ordinary moulds. This can be expressed analytically as follows:—

$D_a = f(P)$
$D_b = f(Re)$, (f being a constant).

P and Re depend mainly on: the height of pouring (H), on the sum of resistance values acting against the flow of metal, and on the viscosity of the metal.

Definition of Heat Radiation.—For the purpose of this paper the factor, resulting from the effect of radiation, which influences the surface durability will be called "heat radiation coefficient ψ." This coefficient comprises the influence of the shape of both the mould and the metal stream, their dimensions, mutual position, and distance. This can be expressed by the function:

$$D_c = f(\psi)$$

In actual foundry practice, the "heat radiation coefficient ψ" changes during pouring, thus complicating the problem. The determination of the dynamic pressure P in the mould becomes possible when the height of pouring (H), and the sum of flow losses, are known.

Experimental Mould A (Fig. 1).—The height of pouring H is known in this case, but the flow losses depend on the viscosity of the metal and the geometrical parameters of the ingate. These parameters are: the shape and the dimensions, pouring height H, and diameter d of the bottom end of the main ingate. When discussing the destructive effect of the impact stream, the dynamic pressure P will be expressed by a double index: d/H.

Experimental Mould B (Fig. 11).—In this case rinsing action occurs, and the surface durability depends on the turbulence of the metal stream, (designated by Re). If the geometrical parameters of the gating system and the viscosity of the metal are kept constant, the surface durability figures can be compared, provided that the velocity v of the metal stream is known. This constitutes a more convenient parameter and is easier to understand in general foundry practice.

Experimental Mould C (Fig. 12).—The problem is simplified when the mould surface lies parallel with the liquid metal surface. In this case it is possible —provided that the temperature of the metal stream is kept constant—to connect the surface durability, as a measure of heat radiation effect, with the distance h (that is the distance of the surface exposed to heat radiation from the surface of the liquid metal).

It is now possible to use the following abbreviations for statements related to the experimental moulds

FIG. 2.—*Damage to core surface after pouring time of* 3 *sec.*

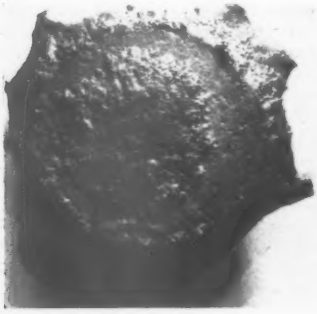


FIG. 3.—*Slight increase in damage after* 24 *sec. pouring time.*

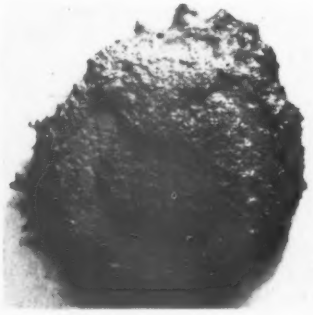
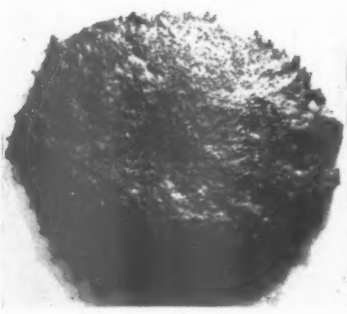


FIG. 4.—*Complete surface destruction of surface after* 30 *sec.*



A, B and C, each of which has, as described previously, its own metal-stream characteristics:—

D_A (d/H) D_B (v) D_C (h)

as expressions of the surface durabilities in each experimental case.

Materials Used

Table 1 lists the sands and moulding materials used, their composition, and their technological characteristics. The selection made can be grouped as follows:—

(1) Core materials consisting of pure silica sand with oil-based core binders. (Item 1 on table 1.)

(2) Unused moulding sands containing natural binders consisting of glauconite and illite (glauconite sands) (Item 2), and also sands containing various aluminium silicate binders (Item 4).

(3) Natural moulding materials with coal-dust additions (Item 3).

(4) Synthetic moulding sands, consisting of pure silica sand and clay (Item 5), or containing binders which set at room temperature, *e.g.*, cement moulding sands (Item 7).

(5) Half-synthetic materials, to be classified between synthetic and natural moulding materials. They are based on silica sands, and their binder is contained in the fat moulding sands which form part of the composition of the moulding material (Item 6).

The metal used in all the experiments was ordinary cast iron from a normal cupola. Casting temperature was about 1,300 deg. C. at the spout and about 1,260 deg. C. when the metal ran into the moulds. The composition of the cast iron varied between the following limits:—C 3.1 to 3.2; Si 2.0 to 2.2; Mn 0.55 to 0.65; S 0.1 to 0.12, and P 0.35 to 0.45. The results obtained with the three experimental moulds A, B and C are listed in Table 1. Explanations will be given in the text later on, when the results are discussed.

Table 1.—*Summary of the Results of the Investigation.*

Exp. No	Type of moulding material	Dry or green	Moisture per cent	Casting temperature deg. C.	Experimental mould A α/H inches	B v_m ft./sec.	C h inches	Effect of the liquid cast iron stream on the mould surface examined after various intervals (in secs.) 3 4 5 6 7 8 9 10 15 20 30 40 50 60 80 100 150 200 300	Durability D_A sec	D_B sec	D_C sec
1	2	3	4	5	6	7	8	9	10	11	12
1*	Core sand with oil binder	Dry	0·0	1260	3/8"/10"	—	—		120<D_A<150	—	—
					5/8"/10"	—	—		33	—	—
					5/8"/14"	—	—		24	—	—
					5/8"/20"	—	—		22·5	—	—
					—	3·5	—		—	60<D_B<75	—
					—	—	3/8"		—	—	20<D_C<30
							1"		—	—	<30
2	Glauconite moulding sand	Green	6·0	"	5/8"/20"	—	—		<3	—	—
		Dry	0·0	"	5/8"/20"	—	—		<3	—	—
		Green	6·0		—	3·5	—		—	24<<	—
3	Moulding material made from glauconite sand	Green	6·0	"	5/8"/20"	—	—		3< D_A <24	—	—
4	Moulding sand with aluminium-silicate clay	Green	6·0	"	5/8"/14"	—	—		<3	—	—
					5/8"/20"	—	—		<3	—	—
		Dry plus blacking	0·0		5/8"/20"	—	—		<3	—	—
					5/8"/20"	—	—		27·5<	—	—
		Green	6·0		—	—	3/8"		—	—	<45
							1"		—	—	60<D_C<120
5*	Synthetic moulding sand	Green	4·5	"	3/8"/20"	—	—		≈150	—	—
					5/8"/14"	—	—		30<	—	—
					5/8"/20"	—	—		~45	—	—
					5/8"/28"	—	—		15	—	—
					—	—	3/8"		—	—	120<<
							1"		—	—	300<<
6	Semi-synthetic moulding sand	Green	6·0	"	5/8"/20"	—	—		3<< D_A <24	—	—
					—	3·5	—		—	60<	—
							3/8"		—	—	<120
							1"		—	—	180<
7	Cement sand	After 24 hrs.		"	5/8"/20"	—	—		<3	—	—

* Ingate diameter 3/8 in. only in these two experiments

KEY:

Type of action of metal stream	Symbol	Degree of surface damage: No damage	First impact	Part damage	Total damage
Impact (A)	○	○	◔	◕	●
Rinsing (B)	△	△	—	◭	▲
Heat radiation (C)	□	□	—	◪	■

INVESTIGATION

Experiment I—Impact

The metal stream entering the experimental mould A (Fig. 1) flows through the runner cap and the ingate and subsequently fills the surface of the recess existing above the sand core to be tested; the surface of the sand core therefore remains continuously covered by the liquid metal. After flowing through the annular groove, the metal runs down into a collecting ladle. The sand test-pieces were cylindrical standard 2-in. dia. cores, 2-in. high, and were produced using an AFS rammer. After a prearranged pouring time, the metal remaining in the recess above the standard core solidifies as a round disc $\frac{3}{8}$ in. thick, weighing 8 oz., on which an impression of the damaged sand core is reproduced. In this

FIG. 5.—*Perfectly intact ring mark after* 120 *sec. (ingate dia.* $\frac{3}{8}$ *in.,* $H = 10$ *in.).*

FIG. 6.—*Little damage after* 30 *sec., when using a synthetic-sand core.*

FIG 7.—*Damage to synthetic-sand core after* 45 *sec. pouring time.*

way a series of negatives of tested sand surfaces is produced, and they record permanently all surface changes that occurred.

The variables in these experiments were casting height (H = 10, 14, 20 and 28 in. respectively), and ingate diameter (d = $\frac{3}{8}$ $\frac{5}{8}$ and $\frac{3}{4}$ in. respectively). The majority of the experiments, however, were carried out with a casting height of 20 in. and an ingate diameter of $\frac{5}{8}$ in. The prearranged pouring times (for the duration of the metal flow through the mould) were as follows:—t = 3, 15, 30, 45, and 60 sec. respectively.

In order to make sure that the metal stream did not wash away parts of the surface of the standard core, a *surface control mark* was incorporated into the sand core. This consisted of a $\frac{3}{4}$-in. dia. ring which was pressed into the flat top of the sand core by the AFS rammer, when producing the core. This made it possible to observe how faithfully the "cast negative" reproduced the surface of the sand core.

Results

The effect of the cast-iron stream on the core sand surface, when they were in contact for between 3 and $22\frac{1}{2}$ sec., appeared to be damage of a similar kind and size, and the conclusion was made that this damage had been inflicted in each case by the *first impact* of the cast-iron stream. Fig. 2 illustrates the damage noticeable after a pouring time of 3 sec., Fig. 3 the progress of the damaging action when pouring time was extended to 24 sec., and Fig. 4 the complete surface destruction after 30 sec. pouring time. The surface durability, as defined, must therefore be a time shorter than 24 sec. It was assumed that the surface durability D_A under the above experimental conditions had a value of about $22\frac{1}{2}$ seconds (for cast iron, ingate dia. $\frac{5}{8}$ in., pouring height H = 20 in.). By keeping the ingate at $\frac{5}{8}$ in. but *reducing* the casting height to 14, and 10 in. respectively, the surface durability D_A *increased* to 24 and 33 sec. respectively. Based on these and similar results, it can be stated to be a general rule that the surface durability against impact by a stream of liquid metal increases when the height of pouring is reduced. Similar results were obtained when both the ingate dia. (reduced to $\frac{3}{8}$ in.) and the pouring height (reduced to 10 in.) were altered. No surface damage occured on the sand core, either by the first impact of the metal stream, or after a total flow time of t = 60, 90, and 120 sec. respectively. Very slight surface damage could be observed after t = 150 sec. Fig. 5 shows the core surface after a flow time of t = 120 second, the ring mark being perfectly intact.

General Conclusions

From the results quoted for oil sand No. 1 (Table 1), the following general conclusions can be made for all sands with similar characteristics:—

(1) The surface durability of a sand surface impinged upon by a metal stream must be considered from two different angles: (*a*) resistance against the first impact of the metal stream, and (*b*) surface durability under the effect of a flowing metal stream within a given time.

(2) When a metal stream impinges upon a sand surface a pouring height (H) exists *below which* the first impact of the metal stream does not damage the surface. This height will be called the "critical pouring height."

(3) If the pouring height H is kept constant and the ingate dia. d decreased, the damage caused by the impact of the metal stream will be reduced, and the surface durability prolonged.

(4) The process of destruction of the tested oil-sand cores begins at an early stage and progresses quickly.

Experiments with other sands

Experiments made with sands 2 and 3 (Table 1) showed the surface durability of unused Glauconite sand to be very low, but that additions of 6 per cent. coal dust (sand 3) considerably improved the resistance against the impact effect of the metal stream. Experiments with red sand (No. 4 in Table 1) were carried out with green- and dry-sand cores, with and without blacking. Again the blackened test-cores had the best surface durability.

Synthetic Sand.—Far better results were obtained with synthetic sand (No. 5 in Table 1). Fig. 6

shows that there was little damage after t = 30 seconds, only a few sand grains being torn from the surface, and the special ring mark remaining well-preserved. The pouring height used was 14 in. with an ingate diameter of $\frac{5}{8}$ in. When the pouring height was increased to H = 20 in., the surface durability was D_A = 45 sec. (Fig. 7). Retaining the pouring height at H = 20 in., but reducing the ingate dia. from $\frac{5}{8}$ to $\frac{3}{8}$ in., no damage could be found after t = 90 seconds. By further extending the time of pouring, the surface durability was found to be D_A = 150 sec. (Fig. 8). Returning now to the original ingate diameter of $d = \frac{5}{8}$ in., but *increasing* the pouring height to H = 28 in., the surface durability was found to be *reduced* to D_A = 15 sec. (Fig. 9).

Summary of Results with Synthetic Sand.—(1) Synthetic sands have a high resistance to the first impact of the metal stream, and they are also highly resistant to further impact by the liquid metal. They therefore represent a good material for sand moulds. (2) The process of destruction of a mould surface made from synthetic sands progresses very slowly.

Half synthetic sands (No. 6) and cement moulding sand (No. 7) both showed a "poor" surface durability" when not blackened.

Conclusions to be Drawn from Results with Sands No. 1-7.—The effect of the impact by a liquid metal stream can be reduced, or even eliminated, by reducing the cross-section of the metal stream. The logical conclusion is therefore that it is advisable to divide the metal stream into several streams of smaller diameters in order to increase the surface durability of the sand.

Experiment 2—Washing

The second series of experiments, using experimental mould B (Fig. 11), was designed to establish the durability of a mould surface against the effect of a washing metal stream. The liquid metal, poured into the runner cup, flows through the runner, the dross trap, and the ingate on to the surface of sand core B, the observation surface of the core being 4 by 4 in., and level with the upper surface of core C (shown on the right in Fig. 11). A recess is created by the rectangular partition wall formed by core A (on the left of Fig. 11), and this recess is filled with metal. The depth of the metal stream flowing over the whole observation surface was h = $\frac{1}{4}$ in. The gating system had a runner diameter of d = $\frac{1}{8}$ in., and a trapezoidal cross-section of 1 by $\frac{3}{4}$ by $\frac{1}{2}$ in. was chosen for the dross trap in order to achieve a complete filling of all gating elements. The casting height of H = 20 in. remained constant for the series of experiments and the pouring times were t = 24, 30, 45, 60, and 75 sec. respectively. The

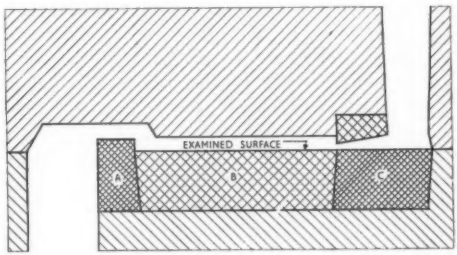


FIG. 11.—*Experimental mould B, used to study "rinsing" effect.*

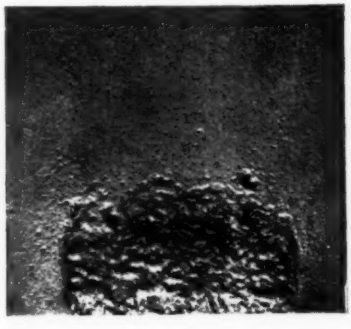
average velocity v of the metal stream flowing through the smallest cross-section of the gating system (the lower runner end) had been calculated to be v = 3.5 ft. per sec. The metal stream therefore had a Reynold's number of Re = 2,580. These values were of fundamental importance for the further comparison of mould durability times. The effect of the metal stream could be observed on the square solidified metal plates (4 by 4 in.), which represent a negative of the tested surface.

Summary of Results with Various Core Sands.—The cast-iron stream which rinsed the surface of

FIG. 8.—*Surface durability of 150 sec. (ingate dia. $\frac{5}{8}$ in., H = 20 in.)*

FIG. 9.—*Surface durability of only 15 sec. (ingate dia. $\frac{5}{8}$ in., H = 28 in.).*

FIG. 10.—*Damage to core B in mould C after a pouring time of 75 sec.*



Effect of a Metal Stream

sand cores made from oil sand No. 1 (Table 1), caused only little damage when pouring times were t = 30, 45, and 60 sec. respectively. However, when the pouring time was extended to t = 75 sec., the section of the tested surface nearest to the incoming metal stream had its surface washed away over an area of 2½ by 1½ in. long (Fig. 10). The surface durability is therefore between the limits of D_B = 60 to 75 sec. Experiments with sands No. 2 and No. 6, having varying degrees of compaction, showed hardly any damage after t = 24, and 60, sec. respectively, which led to the conclusion that these sands possess a good surface durability D_B against the rinsing effect of an enclosed metal stream. The results obtained with sand No. 1 — 7 are tabulated in column 11 of Table 1. In conclusion, it can be said that all the tested sands have a better durability against the washing effect of the metal stream, than against the impact effect.

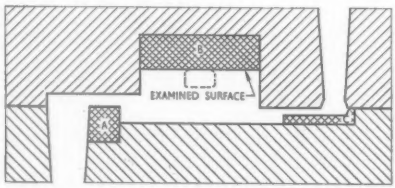


FIG. 12.—*Experimental mould C, used when studying "heat radiation."*

Experiment 3—Heat Radiation

Experimental mould C (Fig. 12) was used for the investigation of the heat radiation effect exercised on a mould surface by a stream of liquid metal. A square sand surface (shown centre of Fig. 12) was used, the sand core having the dimensions 4 by 4 by 1¼ in.

A partition wall was formed by inserting an auxiliary core B (seen on the left of Fig. 12) for retaining and stabilizing the liquid metal surface. A rectangular overflow was used having a width smaller than that of the tested sand mould. The distance h = ⅜ in. (between the surface of the liquid metal and the sand surface under test) remained constant for the whole series of experiments, with the exception of some initial experiments without a sight hole.

FIG. 13.—*Mould C with sight hole incorporated.*

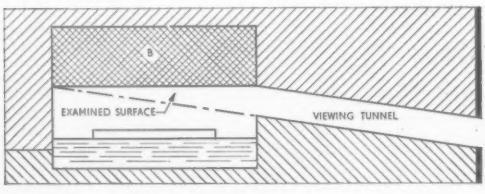


TABLE 2.—*Durability Grades of Mould Surfaces and the corresponding Durability Times D_A, D_B, D_C in seconds, when Pouring Cast Iron at a Temp. of 1,300 deg. C.*

A. Mould surface exposed to metal-stream impact.

Durability grade.		Durability D_A (⅛ in./20 in.) (sec.)
No.	Description.	
0	Unsatisfactory	Below 6
1	Very low	6–12
2	Low	12–18
3	Medium	18–30
4	Fairly good	30–45
5	Very good	45–60
6	Highly satisfactory	Over 60

B. Mould surface exposed to rinsing action of the liquid-metal stream.

Durability grade.		Durability D_B (sec.)
No.	Description.	
0	Unsatisfactory	Below 15
1	Very low	15–24
2	Low	24–36
3	Medium	36–48
4	Fairly good	48–75
5	Very good	75–150
6	Highly satisfactory	Over 150

C. Mould surface exposed to heat radiation of the liquid-metal stream.

Durability grade.		Durability D_C (sec.)
No.	Description.	
0	Unsatisfactory	Below 9
1	Very low	9–15
2	Low	15–24
3	Medium	24–48
4	Fairly good	48–75
5	Very good	75–150
6	Highly satisfactory	Over 150

Such a sight hole (shown in Fig. 13) was cut out from the mould side wall (outside opening 2½ by ⅝ in., opening at the mould interior 1 by ⅜ in.), and this permitted the observation of two-thirds of the tested surface, so that all surface changes occurring during the flow of the metal could be seen. Predetermined pouring times were from t = 20, to t = 300 sec. When the flow of the metal through the mould had ceased, the top part of the mould was lifted and turned over. The tested surface could now be seen and, after cooling, any characteristic damage could be photographed. Experiments were made with sands No. 1, 4, 5 and 6 and the results are shown schematically in Table 1.

Results

A sand core made from oil-sand No. 1, and exposed for t = 20 sec., had not suffered damage (Fig. 14). At t = 30 sec. a dark-brown-coloured surface layer, about ½ in. thick, could be seen, but, when this friable layer was removed, the original colour was unchanged. When the time of exposure was extended, the thickness of the surface layer destroyed by the heat radiation increased. When the exposure time was t = 150 sec., the surface consisted of a layer of silica sand of natural colour (Fig. 15). This proves that the cause of the formation of a friable surface layer is nothing but the total combustion of the oil binder. It therefore follows that oil sands, similar to sand No. 1, only have a short surface durability of between 20 and 30 sec. After that time, a quick destruction of the sand core results.

SUMMARY OF RESULTS

The mould durabilities D_A, D_B, and D_C are directly or indirectly influenced by the geometrical parameters of the experimental moulds. Analytically, this can be expressed as follows:—

$$D_A = F(d, H)$$
$$D_B = F(v)$$
$$D_C = F(h)$$

Comparison of D_A, D_B, and D_C is, on principle, only permissible for the experimental moulds A, B and C, however, the effect of a metal stream on moulds in general foundry practice can be assessed by comparison with these experimental moulds. This can be expressed analytically as follows:—

$$D_a = f(a.D_A) \qquad D_b = f(b.D_B) \qquad D_c = f(c.D_C)$$

where a, b, and c are factors which are based on the geometrical parameters of the ordinary moulds examined. The above formulae therefore connect the surface durability of ordinary casting moulds D_a, D_b, and D_c, with the surface durability times D_A, D_B and D_C, which can be obtained from the experimental moulds A, B and C.

The investigation proves that, for the purposes described in this Paper, the evaluation of mould and core materials, based on AFS or other existing methods, is unsatisfactory. The bonding capacity of the sands and moulding materials, the surface hardness and their permeability, etc., do not characterize sufficiently the surface durability of the sand mould which is exposed to the effect of a metal stream. The durability of the mould surface is one of the most essential factors when a mould is cast. The surface durability, as defined in this paper, is directly connected with the phenomena occurring in the surface layer of the sand mould. In ordinary foundry practice a complex effect on the interior of the mould usually occurs on account of the various kinds of liquid metal streams (which have been indicated). The individual elements of the mould are in most cases exposed first to an intensive heat radiation, and then to a washing action of the metal stream.

The surface durability of the mould against the complex effects of various types of metal stream depends on the sequence of the various types, and on the time during which they affect the mould. In most cases it will be possible to establish—for every mould surface—which kind of metal stream will be of decisive influence on its surface durability.

It can, however, happen in ordinary foundry practice that, as a result of varying preparation of the materials, and varying moisture content, etc., a sudden change takes place in their sensitivity towards the effect of individual kinds of metal stream. If this happens, one of the factors which normally may exert little influence on the mould can suddenly become a dominating factor, decisively influencing the destruction of the mould surface. Even each individual surface element of the mould interior can theoretically, depending on its position in the mould, possess a durability different from the moulding material itself.

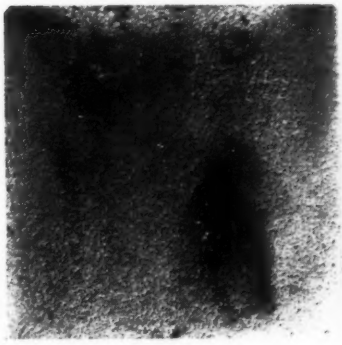


FIG. 14.—*No damage to an oil-sand core, from heat radiation, after* 20 *sec.*

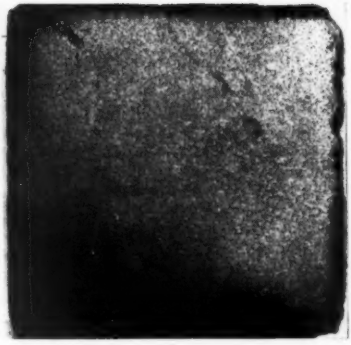


FIG. 15.—*Core surface consisted of silica sand of a natural colour after* 150 *sec.*

Finally, by introducing the term "grade of durability" for mould and core materials, it is possible to allocate a range of "surface durability times" for each of these grades, and for different materials. Table 2 shows seven suggested grades of surface durability. Moulding materials used can be classified into one of these grades, and grouped for each alloy, and for every range of pouring temperatures. Based on values of $d = \frac{5}{8}$ in.; $H = 20$ in.; $v = 3.5$ ft. per sec.; and $h = \frac{1}{4}$ in., the sands and moulding materials used in this investigation can be arranged in order of their surface durabilities, which gives an overall picture as follows:

Oil-containing materials:	$D_B > D_A > D_C$
Unused moulding sands and half-synthetic materials:	$D_B > D_C > D_A$
Synthetic sands:	$D_A > D_B > D_C$

Briefly, the longest permissible pouring time for a simple, not complicated, mould must be shorter than the lowest total "surface durability" of the mould. In the case of complicated moulds it can happen that the surfaces most exposed to the destructive effect of the metal streams will only be so exposed after a certain time following the commencement of pouring. In general, the shortening of the pouring time is to be favoured:—(*a*) If this can be done without risk of increasing the turbulence of the flowing metal, which could cause a reduction of D_b, and (*b*) if this does not increase the dynamic pressure D_a to the permissible limit.

Conclusion

The experimental methods developed for this investigation make the testing of mould and core materials possible. The methods can also be used for the testing and evaluation of various products offered for surface protection of moulds and cores; for establishing the maximum pouring temperature for a given mould; for settling the question of the

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cross-section of the metal stream to be used for a casting, and, above all, for the determination of the permissible maximum pouring height. They can also assist in the investigation of casting defects which might be attributed to surface defects and faults. When continuing the investigation of the problems so far discussed, it will be necessary to endeavour to examine further the physical and chemical properties of the silica sands, moulding sands and auxiliary materials in relation to the mould durabilities D_A, D_B, and D_C.

Institute of Metals

The following members have been elected to the Council of the Institute of Metals and will take office as from April 14: *President:* Mr. G. L. Bailey, C.B.E., M.SC., F.I.M. (director, British Non-Ferrous Metals Research Association); *vice-presidents:* Mr. Hugh Ford, D.SC., PH.D. (Professor of Applied Mechanics, Imperial College of Science and Technology, University of London); Mr. E. H. Jones, A.R.I.C (joint managing director, Capper Pass & Son, Limited, North Ferriby); and Professor H. O'Neill, M.MET., D.SC., F.I.M. (Professor of Metallurgy, University College of Swansea, University of Wales); *honorary treasurer:* Mr. D. P. C. Neave, M.A. (director, British-American Metals Company, Limited; Capper Pass & Son, Limited; James Bridge Copper Works, Limited, and Wolverhampton Metal Company, Limited.); *ordinary members of Council:* Mr. W. O. Alexander, B.SC., PH.D., F.I.M. (assistant research manager, Imperial Chemical Industries, Limited, Metals Division, Birmingham); Dr. N. P. Allen, M.MET., D.SC., F.I.M. (superintendent, metallurgy division, National Physical Laboratory, Teddington); Mr. F. Dickinson, B.SC.(ENG.), F.INST.P., F.I.M. (manager, development and research department Mond Nickel Company, Limited, London); and Mr. L. Rotherham, M.SC., F.INST.P., F.I.M. (research member of the Central Electricity Generating Board, London).

Awards of Medals

It is also announced by the Institute that the Council has made the following awards: the *Institute of Metals (Platinum) Medal* to Dr. L. B. Pfeil, O.B.E., A.R.S.M., F.I.M. (director, Mond Nickel Company, Limited), in recognition of his outstanding contributions to non-ferrous metallurgical science and to the non-ferrous metals industries; the *Rosenhain Medal* to Professor R. W. K. Honeycombe, M.SC., PH.D. (Professor of Physical Metallurgy, University of Sheffield) for outstanding contributions in the field of physical metallurgy; and the *W. H. A. Robertson Medal and Premium* to Dr. R. B. Sims, M.I.MECH.E. (chief engineer, Davy & United Engineering Company, Limited) for a paper on "Automatic Gauge Control in Rolling Mills."

DELIVERIES OF MORGAN CRUCIBLES to customers in Scotland are now being made by the new express freight train—the "Condor"—running between London and Glasgow. The containers are collected from the Battersea works of the Morgan Crucible Company, Limited, during the afternoon and delivered in Glasgow and its environs the following morning, having travelled through the night at express train speeds. This is the first service of its kind on British Railways, and the fastest freight service in this country (400 miles in 10 hours).

Scottish Foundry Industry

Although dull conditions continue for the Scottish steel industry a brighter tone is emerging in the foundry trade, especially in the lighter range of steel castings. No one reason can be given for the recovery, but basically it may be attributed to the replacement of stocks which have been heavily depleted.

The manufacturers of castings for domestic appliances centred in the Falkirk area are only now beginning to benefit from the relaxations in credit restrictions, because extensive stocks in the hands of wholesalers and retailers had first to be moved. The improvement, however, is not confined to that section of the trade. More jobbing and repetitive castings orders for general engineering have been forthcoming, although at keenly cut profit margins. To a limited extent the shipyards have also come back on the scene, but orders are still less numerous than in recent years.

Heavier iron foundries catering for the steel industry are faced with difficulties as the requirements of ingot moulds, bottom plates, and slag ladles, the main products, depend on activity in the steel-melting shops. The smaller-ingot output during the past nine months restricted the demand on iron foundries, and the situation was aggravated by melting shops reducing their stocks of moulds as steel production diminished. The position now appears more stable, although it may be some months before there can be any substantial improvement in this section of the trade.

Pig-iron from stock as well as from furnaces in blast is ample for all requirements, and the question of blowing in any furnaces at present out of commission does not yet arise. All grades of scrap are relatively easy to obtain with the exception of cast iron. Apart from any other consideration, this shortage of cast-iron scrap reflects the general improvement in the foundry trade.

Street-lighting Column Competition

The Aluminium Development Association announces an open competition for the design of aluminium street-lighting columns. The objective of this competition is to encourage the evolution of good designs (taking especially into account æsthetic appearance, economy of construction, and the advantages of aluminium) and the eventual wider adoption of such lighting columns in Great Britain. Entries are invited from lighting specialists, architects, industrial designers, engineers and other individuals or groups. Competitors may submit more than one entry, and joint and group entries are allowed.

For the design of either a 25-ft. high column for group A: trunk-road lighting, or a 15-ft. high column for group B: non-trunk-road lighting, the first prize will be £250; the second £100; the third £50, and there will also be a student's prize of £75.

The following have agreed to act as assessors and they will be assisted by a panel of technical advisers:—The Hon. Lionel Brett, M.A., F.R.I.B.A., nominated by the president of the Royal Institute of British Architects; Professor Sir Alfred Pugsley, O.B.E., D.SC., F.R.S., past-president of the Institution of Structural Engineers, and Sir Gordon Russell, C.B.E., M.C., R.D.I., F.S.I.A., director, the Council of Industrial Design. Copies of the competition regulations and conditions (with specification and design requirements) and of the entry form may be obtained from the secretary, Aluminium Development Association, 33, Grosvenor Street, London, W.1, and entries must be received not later than 12 noon on July 1.

Two German Conferences

Foundry and Engineers Conference, Stuttgart:

A joint Foundry and Engineers Conference to be held in Stuttgart will cover a period of two days, *viz.*, June 25 and 26. It is being organized by the *Verein Deutscher Giessereifachleute* (German Foundrymen's Technical Association) and the following provisional programme has been announced: On the first afternoon four papers will be presented on the subject of spheroidal-graphite cast iron and its applications. They are: Introductory lecture entitled "Spheroidal-graphite Cast Iron," by Prof. Dr.-Ing. H. Wiegand (of the University of Technology, Stuttgart); "Use of S-g Iron in Hydraulic Machinery," by Dr. E. Mortara (of Caster S.p.A., Italy); "Development of S-g Iron Pipes for Gas and Oil," by M. Grandpierre (of Halberger GmbH, Brebach, Saar), and "S-g Iron in Gasworks," by Mr. Dienelt, chief engineer (of the Hamburg Gasworks GmbH).

The technical session will be continued on the morning of June 26, when six further papers will be presented, *viz*: "S-g Iron Ingot Moulds for Steelworks," by Dr. A. B. Everest, B.SC., F.I.M. (of the Mond Nickel Company, Limited, London); "Fatigue Strength of S-g Iron at Various Conditions of Heat -treatment," by Dr. J. Motz (of Metallgesellschaft, Frankfurt); "Austenitic S-g Iron," by Dr. Q. Nickel and Dr. A. B. Everest; "Magnetic Properties of S-g Iron," by Dr. H. Dietrich (of DEW, Krefeld); "Quality Requirements for Users of S-g Iron," by Dr. H. Timmerbeil (of Maschinenfabrik, Buckau R. Wolf AG, Kiel), and "New German Standards for S-g Iron and Directions for their Use," by Dr. H. Mühlberger (of Metallgesellschaft AG, Frankfurt).

Cast Iron for Machinery Construction

A conference on the subject of cast-iron as a material for machinery construction will be held in the Technical High School at Darmstadt, Germany, on April 24 and 25. It has been arranged jointly by *Verein Deutscher Giessereifachleute, Zentrale fur Gussverwendung* and *Verein Deutscher Ingenieure*. On the first day, technical sessions will be held in the morning under the chairmanship of Prof. H. Jungbluth when three papers will be presented as follow: "Cast Iron as a Material for Machine Construction in Comparison with other Cast Materials," by Dr. R. Wittmoser; "Tensile Strength of Castings and Separately-cast Test-pieces," by Prof. W. Patterson, and "Characteristic Points in the Choice of Materials for Cast Construction," by Prof. H. Wiegand. In the afternoon, the technical sessions will be continued under the chairmanship of Prof. K. Löhberg and the following papers will be presented: "Developments of Standards for Cast Iron with Lamellar-graphite (GGL) and Cast Iron with modular-graphite (GGG); "Damping Capacity of Cast Iron," by Dr. A. Troost, and "Electro-magnetic Properties of Cast Iron—Report on the results of the latest researches on GGL and GGG," by Prof. A. Königer. The second day will be devoted to inspection of the College premises and equipment, with Prof. C. Stromberger, Prof. H. Triebnigg and Prof. H. Wiegand leading tours of their respective departments.

Factory Equipment Exhibition

The Factory Equipment Exhibition, and Heat and Sound Insulation Exhibition, will be held this year at Earls Court, London, from April 7-17. Some of the stands having exhibits of particular interest to foundrymen will be reviewed in the April 2 issue of the JOURNAL.

Production Quotas for ECSC Coal?

Reluctant to declare a "state of manifest crisis" in the European coal situation because of the atmosphere of panic which might be caused, the High Authority of the European Coal and Steel Community on Thursday, March 5, appears to have taken decisions which are practically synonymous with such a declaration. After examining the situation it has decided to refer the problem to its consultative committee and to seek advice on the desirability of a system of production quotas. The High Authority president, Mr. Paul Finet, was careful to point out that there was no general crisis as the state of the steel industry was far from critical.

It is also proposed to freeze stocks at their present level in order to avoid further unemployment by sales from stocks and to grant help to miners by guaranteeing a minimum wage as close as possible to normal earnings.

Action is likely to be protracted as the committee met on Tuesday. The plan must then come before the Council of Ministers on March 23 and Mr. Finet indicated that it was unlikely that the Council would take a definite decision until a subsequent meeting.

Italy has opposed the plan if it means increased prices for coal for Italian steelworks and other consumers, but as negotiations with Ruhr coal owners have failed to reach agreement for prices to match those of American coal imports Italy may have to toe the line and pay more for her coal in the interests of ECSC solidarity. France is also likely to oppose the plan, it is understood, if any reduction in French coal output is entailed.

Both the German Free Democratic Party and the West German Industrial Institute, which speaks for the Federation of Industries, consider the High Authority's plans to be unrealistic by affecting economic as well as uneconomic pits and delaying rationalization of the industry. They also ask how the money is to be found to pay minimum rates to miners.

Meanwhile ECSC coal stocks continue to soar. They are at a record total of over 26,000,000 tons and, it is estimated, will reach 30,000,000 tons by July.

Control of Dust and Fume in Industry

The tenth conference of the British Occupational Hygiene Society has been arranged for Tuesday and Wednesday, April 14 and 15, and will be held in Stephenson Hall (University of Sheffield), Oakholme Road, Sheffield, 10. The conference, which will be devoted to a discussion of the control of dust and fume in industry, is to be opened by H.M. Chief Inspector of Factories. Papers will be presented by speakers with experience of the subject in the cotton and asbestos industries, in iron foundries, in welding and electro-plating. Non-members are eligible to attend this conference on payment of a registration fee.

A conference dinner will be held in Stephenson Hall on the evening of April 14 (the cost being 25s. per head, inclusive of wines), and a visit to the steelworks of Steel, Peech and Tozer has been arranged for the afternoon of April 15. Those wishing to attend the conference are asked to advise the honorary scientific secretary, Dr. D. Turner, Associated Ethyl Company, Limited, Ellesmere Port, Cheshire, as soon as possible, indicating their requirements.

Fifty-sixth IBF Annual Conference

Technical and Social Programme at Scarborough June 9-12.

The Institute of British Foundrymen will hold its fifty-sixth annual conference this year at Scarborough from June 9 to 12 inclusive. The event is being organized by the Tees-side branch, and Mr. Charles H. Wilson, a past-president of the branch, will be installed in the office of president of the Institute during the conference.

Although the attractiveness of Scarborough as a resort hardly needs emphasizing, this is an incidental advantage to the more important considerations that it offers excellent facilities for the business and social gatherings of the conference, while at the same time it lies within reasonable distance of the industrial areas which are providing that essential feature of a conference—works visits. It is also a pleasant centre for the ladies; not only will their pleasure be increased by the holiday attractions in which they will have time to indulge, but there are many excursions to be made in the nearby delightful countryside.

Conference Office. The conference office will be established on Tuesday, June 9, at the Grand Hotel, Scarborough. Communications prior to this date should be addressed to the head office of the

Aerial view of Scarborough showing the assembly points, places to be visited and hotels listed in the IBF conference programme.

Key: (1) Books (Fashions), Limited; (2) Public Library; (3) Royal Hotel; (4) Information Centre; (5) Town Hall; (6) St. Nicholas Hotel; (7) Olympia Ballroom; (8) Manor Hotel; (9) Grand Hotel; (10) Crown Hotel; (11) Spa Theatre; (12) Spa Ballroom; (13) Floral Hall.

Institute, St. John Street Chambers, Deansgate, Manchester, 3.

Programme

Tuesday, June 9

Afternoon: Council and committee meetings in the Sea View Lounge at the Grand Hotel, Scarborough.

8 p.m. to 12 midnight: Civic reception at the Olympia Ballroom, Scarborough. Dancing, cabaret and buffet supper. (Members and ladies; dinner jacket or dark suit.)

Wednesday, June 10

9.15 a.m.: Annual general meeting at the Spa Ballroom, Scarborough. (Members only.) Presentation of awards.

10.45 a.m.: Adjourn for coffee at the Spa Theatre. (Members, invitation.)

11 a.m.: Presidential address by Mr. C. H. Wilson.

11.30 a.m.: Edward Williams lecture entitled "Thoughts on the Future of the Ironfounding Industry," by Sir Frederick Scopes.

12.30 p.m.: Conference adjourns.

12.45 for 1 p.m.: Luncheon at the Royal and Grand Hotels, Scarborough. (Members and ladies, invitation.)

Conference recommences at 2.30 p.m. with technical sessions at the Library, Vernon Road, Scarborough. (See programme on p. 334).

5 p.m.: Conference adjourns.

7 p.m.: Reception at the Grand Hotel, Scarborough, by the president and Mrs. Wilson.

7.30 p.m. to 1 a.m.: Annual banquet in the Grand Hotel, Scarborough, followed by dancing. (Members, ladies and official guests; evening dress.)

Thursday, June 11

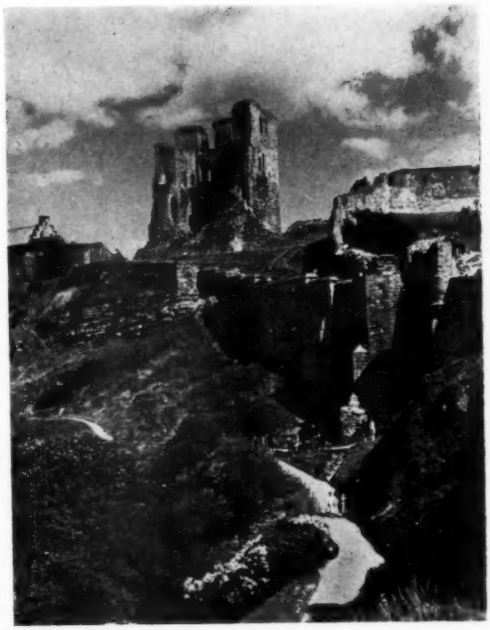
Members will take part in one only of the following groups of visits, departing by coach from St. Nicholas Cliff (beside the Information Centre), Scarborough:—

8 a.m.: (1) Morning. (*a*) Darlington Forge, Limited. Afternoon. (*b*) Summerson's Foundries, Limited, Darlington. Return to Scarborough at 7.15 p.m.; or

8.15 a.m.: (2) Morning. (*a*) Richardsons, Westgarth (Hartlepool), Limited, Hartlepool. Afternoon. (*b*) Dorman Long & Company, Limited, Lackenby Works, Middlesbrough. Arrive Scarborough on return at 6.45 p.m.; or

8.30 a.m.: (3) Morning. (*a*) Ashmore, Benson, Pease & Company, Stockton-on-Tees. Afternoon. (*b*) Head Wrightson & Company, Limited, Thornaby-on-Tees. Arrive Scarborough on return at 6.15 p.m.; or

8.30 a.m.: (4) Morning. (*a*) Head Wrightson & Company, Limited, Thornaby-on-Tees. Afternoon. (*b*) R. W. Crosthwaite,* Limited, Thornaby-on-Tees. Arrive Scarborough on return at 6.15 p.m.; or



Scarborough's historic castle.

8.30 a.m.: (5) Morning. (*a*) Davy & United Roll Foundry, Limited, Billingham. Afternoon. (*b*) Imperial Chemical Industries, Limited (Billingham Division), Billingham. Arrive Scarborough on return at 6.45 p.m.; or

8.30 a.m. (6) Morning. (*a*) Cochranes (Middlesbro') Foundry, Limited. Afternoon. (*b*) Dorman Long & Company, Limited, Lackenby Works, Middlesbrough. Arrive Scarborough on return at 6.30 p.m.

8 p.m.: Visit to the theatre for international variety at the Floral Hall, Scarborough.

Ladies' Programme

Tuesday, June 9

4 p.m.: Ladies' reception and tea in the Ballroom of the Royal Hotel, Scarborough. Evening programme as for members (evening or cocktail dress).

Wednesday, June 10

11 a.m.: Conversazione and coffee in the Conference Hall at the Royal Hotel, Scarborough.

12.45 for 1 p.m.: Luncheon at the Royal and Grand Hotels, Scarborough. (Members and ladies, invitation.)

3 p.m.: Mannequin parade presented by Books (Fashions), Limited, of Sunderland and

General view of the sea front, Scarborough.

Scarborough, followed by tea in the Ballroom at the Royal Hotel, Scarborough. Evening programme as for members.

Thursday, June 11

Ladies leave by coach from St. Nicholas Cliff (beside Information Centre), Scarborough, for one only of the following visits:—

10.15 a.m. (1) Imperial Chemical Industries (Wilton), Limited, preceded by lunch at the Zetland Hotel, Saltburn. Returning to Scarborough at 6.15 p.m., or 10.30 a.m. (2) Excursion to York combined with a visit (afternoon) to the chocolate factory of Rowntree & Company, Limited, York, or (3) Excursion to York combined with a free afternoon to visit places of interest or shopping in York. Arrive Scarborough on return from both visits (2) and (3) at 6.15 p.m., or 11 a.m. Excursion to Whitby area, returning to Scarborough at 5.30 p.m.

8 p.m.: Theatre evening as for members.

Friday, June 12

Morning free until luncheon 12.45 for 1 p.m., at the Royal and Grand Hotels.

2.15 p.m.: Departure from St. Nicholas Cliff, by coach on one only of the following visits:—(1) Visit to Helmsley (a pretty town on the river Rye); (2) Rosedale and Hutton-le-Hole; (3) Ravenscar. Visit (1) will arrive on return to Scarborough at 6 p.m., visit (2) at 6.15 p.m. and visit (3) at 5.45 p.m.

8 p.m. to 1 a.m.: Programme as for members.

Provision of luncheons and teas for members participating in the works visits is kindly being made by the various companies visited.

Applications for hotel accommodation should be made direct to the hotel and not to the Institute, and in all cases the name of the Institute should be mentioned. The last date for receiving conference reply forms (at the Manchester office of the Institute) is May 9.

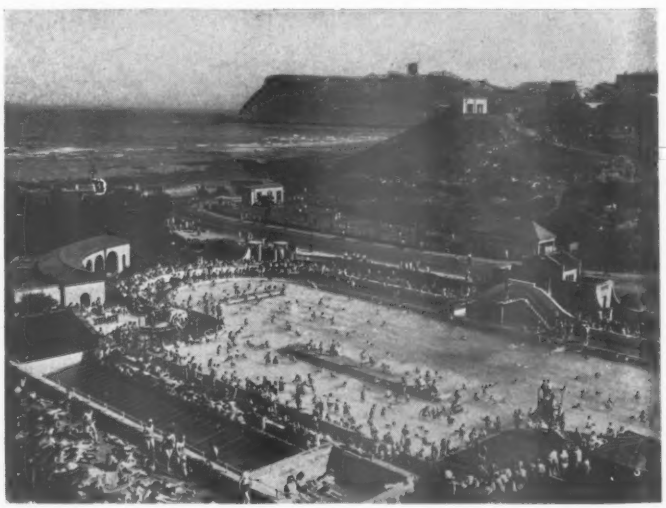
Technical Sessions

Wednesday, June 10

2.30 to 5 p.m.: Two simultaneous sessions.

Session A. (Concert Room, The Library, Vernon Road, Scarborough). Paper No. 1, "Applications of Ductile Cast Iron in the Field of Pipe-lines," by M. C. M. Grandpierre, M.SC. (Officially sponsored paper from *L'Association Technique de Fonderie*); No. 2, "Manufacture of Spun Soil- and Rainwater-pipes," by H. H. M. Milnes and E. Morgan (member); No. 3, "Effect of Specimen Form on Tensile-strength of Cast Iron," by G. N. J. Gilbert, A.M.I.MECH.E., A.I.M. (BCIRA paper).

Session B. (Lecture Room of the Library.) Paper No. 4, "Recent Developments in Centrispinning High-alloy Steels and Other Materials," by A. E. Thornton, A.MET., A.F.R.Ae.S. (member); No. 5,



The swimming pool at Scarborough.

"Some Experiences in the Manufacture of Steel Castings for High-pressure Turbine Components," by G. L. Hancock (member) and J. Taylor, M.I.MECH.E., F.I.M. (member); No. 6, "Measurement and Control of Dust in Foundries," by A. H. Sully, PH.D., M.SC., F.I.M. (member), C. M. Stoch and J. M. Slater (BSCRA paper).

Friday, June 12

9.30 a.m. to 12.30 p.m. Two simultaneous sessions.

Session C. (Concert Room of the Library.) Paper No. 7, "Practical Application of Reinforced Epoxy-resins for Foundry use," by H. A. Burton. (Officially sponsored paper from the American Foundrymen's Society); No. 8, "Castings for the Chemical Industry," by G. A. J. Begg; No. 9, "Running an Apprentice Competition," by A. P. Riley (member) and T. Hurst (member).

Session D. (Lecture Room of the Library.) Paper No. 10, "Running and Gating of Copper-alloy Castings," by W. W. Glick, A.I.M. (associate member), R. S. Jackson, B.SC., A.R.S.M., and R. W. Ruddle, M.A., F.I.M. (member) (BNFMRA paper); No. 11, "Investment Casting—Recent Experiences and Improved Techniques," by D. F. B. Tedds, F.I.M. (member); No. 12, "Some Factors Influencing the Production and Control of Quality of Aluminium-alloy Die-castings," by R. R. Woodward and H. J. Proffitt, A.I.M. (member).

2.30 to 5 p.m. Two simultaneous sessions.

Session E. (Concert Room of the Library.) Paper No. 13, Report of sub-committee T.S.47 of the Technical Council, "Foundry Coke"; No. 14, "Experience in the use of Brown-coal Char as a Fuel for Foundry Cupolas in Victoria," by D. G. Evans, M.SC., R. S. Higgins, M.ENG.SC., and G. L. Kennedy, M.SC.; No, 15, "Ingot Moulds—a Critical Survey," by K. G. Harris, B.SC., A.I.M. (associate member).

Session F. (Lecture Room of the Library.) Paper No. 16, "Modern Concepts on Clay Minerals for Foundry Sands," by Dr. F. Hofmann; No. 17, "Resin and Sand Economy and Surface-finish in Shell Moulds," by R. S. Jackson, B.SC., A.R.S.M., and W. W. Glick, A.I.M. (associate member) (BNFMRA paper); and No. 18, Report of sub-committee T.S.46 of the Technical Council, "Mould Materials."

Official visits to the Engineering and Marine Exhibition

Monday, April 20, is the day on which an official party of the Foundry Trades' Equipment & Supplies Association will visit the Engineering, Marine, Welding and Nuclear Energy Exhibition, which is being held at Olympia, London, from April 16 to 30 inclusive. At the moment, two further official visits have been organized and it is expected that others will also be arranged. Wednesday, April 22, is the date arranged for a visit by the National Society of Master Patternmakers, and Thursday, April 30, is the day on which an official party of the Institute of British Foundrymen, headed by their president, Mr. A. E. Peace, will attend.

Applications for Tin

Research work on the production of titanium/tin alloys by powder-metallurgy methods was described to scientists at the eighth Annual Paris Tin Conference at the *Maison de la Chimie* recently. Mr. R. F. Smart, research metallurgist at the Tin Research Institute, London, said "The procedure developed gave very promising results, and the studies are being extended to the production of titanium/aluminium/tin alloys by this method. In general, the alloys under consideration have the advantage of maintaining excellent strength at high temperatures."

At the same conference, Dr. W. E. Hoare, assistant director of the Tin Research Institute, reviewed recent work on the use of tin to control the structure of cast iron. "The addition of quite small amounts of tin, usually less than 0.1 per cent., suppresses the ferrite phase," Dr. Hoare told his audience, and thus produces metal of better wear-resistance. At the same time, the addition of tin does not promote the production of free cementite, which might adversely affect machinability. The effect of tin is very marked in hypo-eutectic and in nodular-graphite irons, but somewhat less marked in the softer hyper-eutectic iron.

"Recent experimental evidence confirms that the addition of tin in reasonable amounts to nodular irons does not adversely affect the sphericity of the graphite nodules" concluded Dr. Hoare.

Professor Albert Portevin, C.B.E., President de l'Academie des Sciences, and a foreign member of the Royal Society, presided over the conference and introduced the programme. Other speakers included Mr. C. Guinard, who discussed aluminium/tin bearing alloys; Mr. C. Chevalier, who spoke on tin-base die-casting alloys, and Mr. P. A. Jacquet, who described a new method for the metallography of tin.

GEC Power-station for Japan

General Electric Company, Limited, of Magnet House, Kingsway, London, W.C.2, has been selected to negotiate a contract for building Japan's first nuclear power-station at Tokai Mura, 65 miles north-east of Tokyo. The design submitted by GEC in collaboration with Simon-Carves, Limited, has been approved by the Japan Atomic Power Company and will form the basis for the negotiations. It is hoped that the details of the contract, the total value of which will be about £30,000,000, will be finally decided upon later this year.

In this event GEC, as main contractor, will be responsible for the design of the entire project. Certain items, however, will be manufactured by Japanese firms working to the group's designs. In this connection, GEC has recently concluded, subject to Japanese Government approval, a long-term licensing agreement with a consortium of fourteen leading Japanese companies known as the First Atomic Power Industrial Group (FAPIG). Apart from manufacturing responsibilities, members of this group will also undertake the site construction work in which they will act under the direct supervision of experienced engineers from GEC and Simon-Carves.

The power station, which will have a net electrical output of 150,000 kw., will be powered by a single gas-cooled graphite-moderated reactor of the same basic type as the two reactors at present being built by the group at Hunterston in Scotland. Many novel features have been embodied in the design, however, particularly with regard to structural and control considerations, in order to ensure the safety of the installation under earthquake conditions. The station will take approximately four years to build and is expected to be in operation by mid-1963.

Slight Improvement in Employment

Slight fall of 12,000 to 609,000 in the number of unemployed between January 12 and February 9 is announced by the Ministry of Labour. The number of wholly unemployed fell by 1,000 and of temporarily unemployed by 11,000.

Expressed as a percentage of the estimated number in employment the February figure was 2.8 per cent., the same as in January, and 0.9 per cent. higher than a year ago. There were 302,000 (55 per cent.) of the wholly unemployed who had been out of work for more than eight weeks.

The number of workers on short time in the manufacturing industries on January 24 was 168,000, 4,000 less than on January 3. There was also a fall of 1,000 in the number of unfilled vacancies. It is believed that the improvement in employment in the manufacturing industries was maintained, the only setback being in metal manufacturing, where there was an increase of a little over 1,000 in the number of unemployed.

Regionally there was improvement everywhere except in Scotland and Wales and, most unusually, in London and the south-east. Even in Northern Ireland, the most seriously affected region, the percentage dropped from 9.7 to 9.4.

Those in mining and quarrying dropped during the month by 1,000 to 844,000, compared with 870,000 a year ago; chemicals and allied trades rose by 1,000 to 536,000 (537,000), and vehicles by 4,000 to 1,226,000 (1,248,000). There was no change in metal manufacture—548,000 (581,000), and the number in engineering, metal goods, and precision instruments fell by 3,000 to 2,789,000 (2,857,000).

Percentage rates of unemployment above the national rate of 2.8 are as follow:—Northern Ireland, 9.4; Scotland, 5.4; Wales, 4.7; northern, 3.8; north-western, 3.5; south-western, 2.9. Below the national rate are:—East and West Ridings, 2.5; Midland, and eastern, and southern, 2.1; north Midland, 2.1; London and south-eastern, 1.7.

Compensation for British Aluminium Chairman & Deputy

Shareholders of the British Aluminium Company, Limited, at a special meeting on April 1, will be asked to approve the payment of £30,000 tax free to Lord Portal of Hungerford, former chairman of the company, and £58,000 tax free to Mr. Geoffrey Cunliffe, former deputy chairman and managing director, for loss of office.

Lord Portal and Mr. Cunliffe left the board and relinquished all their directorships and other offices with the group last month following acquisition of control by Tube Investments, Limited. Lord Portal joined the board in 1951 and has been chairman since 1952. Mr. Cunliffe, a pre-war director, was elected deputy chairman in 1947.

At the same meeting a further resolution will be proposed to alter the group's articles of association so as to increase the maximum number of directors from 12 to 16, to provide for the appointment of alternate directors, and to remove the share qualification at present required for membership of the board.

UNITED GAS INDUSTRIES, LIMITED—Mr. H. H. Bates will assume the chairmanship on April 1. Mr. Norman L. Smith, who temporarily undertook these duties on the retirement of Col. W. C. Smith, the last permanent chairman, becomes deputy chairman.

The Newer Metals

As a result of the development of nuclear energy and the coming of the "space age," the newer metals such as titanium, zirconium and beryllium would soon become an essential part of the overall industrial picture said Dr. N. P. Inglis, research director of the Metals Division of Imperial Chemical Industries, Limited, when he delivered the Viscount Nuffield Paper to the Institute of Production Engineers in Birmingham, on March 11, at the Department of Mechanical Engineering of Birmingham University.

The subject of the lecture was the "Production, Fabrication, Properties and Uses of some of the Newer Metals" and Dr. Inglis commented that for many years, iron, aluminium, copper, nickel, zinc and lead had been the chief basic metals used for structural purposes, while the newer metals had been little more than laboratory curiosities and certainly not of industrial significance. Such metals, including also niobium, hafnium, and tantalum were none of them new in the sense that their existence had only recently become known. Titanium was recognized in 1791 and isolated in impure form in 1825; zirconium was recognized about the same time and isolated in 1824; whilst beryllium was recognized in 1798 and isolated in 1828. The existence of niobium was recognized by various scientists in the years between 1801 and 1844. The reason why these metals, which had been lying dormant for so many years, should now be of interest to practical engineers, Dr. Inglis continued, was that new inventions, new designs, and new processes, were calling for entirely new construction materials. The discovery and development of nuclear energy, which could rightly be regarded as leading to a second industrial revolution, was playing a major part in stimulating effort in some of these new metals.

"Just as development of the use of steam in railways and shipping rather more than 100 years ago, necessitated a material of construction superior to cast and wrought iron and, therefore, fathered the manufacture of steel in large tonnages, so the special requirements of nuclear engineering demand the availability of materials having certain special requirements" Dr. Inglis said. He added that the reason for the active interest in the newer metals was that the advances of mechanical and physical science and practice demanded it. These metals were no longer solely of academic or subsidiary interest, they were now, or shortly would be, an essential part of industry and they would be available choices for the engineer when selecting the materials of construction to suit the requirements of his mechanism. Titanium was by no means rare, Dr. Inglis pointed out, and metals like zirconium and vanadium were more abundant that the more commonly used metals such as nickel, copper and zinc.

Arcs to Replace Open Hearth

Birlec, Limited, and Birlefco (Melting), Limited, will be represented at the National Industrial Production Show, Toronto, Canada, from May 4-9 on Stand No. 26. The latter firm is making a serious contribution to the adoption of electric melting in British bulk-steel production, hitherto catered for almost exclusively by open-hearth furnaces. Three 40-ton arc furnaces are currently being erected at Brymbo Steel Works, Limited, for ordinary steel-ingot production. Each furnace is 16 ft. dia., with a rating of 12,500 kva. and has a nominal capacity of 40 tons.

Specifications for Copper-alloy Ingots and Castings

BBBIMA Comment on Draft Standard

Proposed new specifications for copper-alloy ingots and castings, revising those in BS.1400, have recently been circulated by the British Standard Institution for comment by interested parties. The views of the British Bronze and Brass Ingot Manufacturer's Association are expressed in the following statement:—

General

This Association is in favour in principle of the raising of technical standards in the foundry industry, but would draw attention to the need to appreciate the technical and cost considerations implicit in the proposed introduction into BS.1400 specifications of finer limits for impurities, more detail and increased mechanical properties.

Insufficient information is available at the present time on such subjects as the optimum amounts of alloying elements, and the effect of impurities, to justify the introduction of more detailed limits into the current specification. This must increase the cost of alloys, or lead to the use of other specifications which is undesirable. The current BS.1400 has been in use for a number of years and in general has proved very satisfactory. There are obviously some anomalies which industry would wish to see corrected, but members of this Association are of the opinion that there is no case for radical changes or the extensive introduction of individual impurity limits. Ingot manufacturers have not found any general desire on the part of their customers to see changes in the current specifications; neither have the users of these alloys encountered difficulty in meeting foreign competition on quality, but the revisions, which will increase the cost of ingots by up to £20 per ton, and in the case of aluminium-bronze by considerably more, will make it more difficult to compete on price.

As no over-riding technical need has been shown for revision of the specifications in general use by industry, the Association suggests that unless additional scientific data proves them necessary and the analytical techniques which they necessitate are made available, they should be abandoned.

Detailed Criticism

Analytical Requirements

The specification requires a guarantee that stated limits for some impurities have not been exceeded, *e.g.*, aluminium, silicon, iron—a guarantee required not only from the ingot supplier but also from the founder which can only be met by chemical analysis of actual castings. Since, in the case of aluminium and silicon, economic control-analysis methods to the limits required by the new specification are not available, it will obviously be impossible to fulfil these requirements.

Impurity Limits

It is the considered opinion of the ingot makers that alloys such as LG1, LG2 and the lead bronzes could contain considerable more impurities than the present allowable 0.5 per cent., without the slightest detriment to their mechanical properties. Furthermore, there does not seem to be any evidence to support the proposed low-iron limits in the lead-free gunmetals, phosphor-bronzes, and lead-bronzes.

There is little doubt that very small amounts of aluminium oxide can adversely affect the pressure-tightness of gunmetal and bronze castings. Aluminium can readily be removed in refining by oxidation and the use of suitable fluxes, but as there is no rapid method for the estimation of aluminium, it has in the past usually been deemed sufficient evidence of aluminium removal if the ingot shows no trace of the white oxide-skin, so characteristic of contamination by aluminium in excess of 0.02 per cent. This visibility test has worked well in practice. Ingot makers can supply alloys to a guaranteed minimum of aluminium or any other element, but the cost of these and that of analytical control and the delay will cause a steep increase in price.

The suggested lowering of the zinc limit in LPB1 from 2 to 1 per cent. raises an important point. A large tonnage of sand castings, which are quite satisfactory, is being made in this alloy. From the ingot-makers' point of view, this alloy has provided an economic use for materials which were too high in zinc to be conveniently used in the production of other phosphor-bronzes and too high in phosphorus to be used in the manufacture of gunmetals. From the founders' point of view, lowering the zinc content will substantially increase the price.

Mechanical Properties

If the present mechanical tests serve a useful purpose at all, it is because a failure to obtain the admittedly low minimum requirements, shows that the presence of some deleterious impurity has been overlooked in the chemical analysis, or that something is radically wrong with the melting conditions or moulding techniques. It is difficult to see that any useful purpose will be served by raising the specification requirements. Many founders may not be happy to see an increase in the present minimum test requirements, although they have no difficulty in providing satisfactory castings.

Costs

It is obvious for the following reasons that the proposed revisions would result in increased costs:

Material: Purer alloys require higher grades of raw material for their manufacture.

Control: Finer limits necessitate more-involved analysis and increase delays in manufacture both

Copper-alloy Specifications

for the ingot manufacturer and the founder. At present most foundries rely on the certificate of analysis of the ingot manufacturer as guaranteeing the quality of the metal, a procedure which usually worked well in practice. The proposed specifications require an undertaking by the founder that the castings do not contain impurities in excess of very small stated limits. To be able to give this undertaking, the founder must analyse the metal of his castings. Even with ingots to specification there is a danger when remelting of picking up impurities in excess of the low limits proposed; this may even preclude the use of process scrap such as runners and heads. It is doubtful if the average founder realizes the cost this analytical work will entail. Spectrographic apparatus, for example, necessary for the estimation of silicon of the order of 0.01 per cent., would cost upwards of £2,000.

Rejections: The danger of rejected castings is increased.

Exports: A certain amount of export trade in ingots is essential to the economy of the ingot-manufacturing industry and by making greater use of the investment in the industry, to facilitate low prices on the home market. Any alterations to the specifications which tend to make exports more difficult will obviously be reflected in increased prices on the home market, or restriction in the use of the specifications, and may open the way to the export of scrap to the detriment of home industry.

Conclusion

Industry should consider very seriously the financial implications before approving the proposed new standard.

Acquisition Bid for C. & W. Walker

Directors of C. & W. Walker, Limited, gasworks engineers and ironfounders, etc., of Wellington (Salop), consider an acquisition of the share capital of £183,947 on terms recently offered on behalf of an undisclosed purchaser would not be in the best interests of holders or the company as a whole. Considerable activity in the company's 5s. ordinary shares preceded the directors' statement to members. A price of 10s. per ordinary and £1 per 7½ per cent. preference £1 share was indicated, but the intermediaries have declined to divulge the principal's name, although it is stated to be a financial trust. The deal would involve £326,894.

In view of greatly improved results achieved for the past year the directors intend to recommend a substantial increase in the ordinary dividend for the year ended January 31, 1959. A 12½ per cent. dividend has been paid for each of the four previous years.

Results will be available by the week commencing April 20, and the detailed accounts and chairman's statement will be circulated early in May.

Mr. ALEX. J. LAKER, who for many years has been with the London sales office of Guest Keen & Nettlefolds (Midlands), Limited, and was until recently London area home sales manager, has moved to the Heath Street Works, Birmingham, where he has been appointed sales promotion manager.

Russian Order for Vickers'

British firm Vickers-Armstrongs (Engineers), Limited, has beaten Krupps, of Germany, in securing a contract worth £2,250,000 for the supply of chemical industrial plants to Russia. The contract is subject to "contract conditions" and the supply of plant is to be undertaken in association with another British firm, Highpolymer & Petrochemical Engineers, Limited, the designers and consultants.

During Mr. Krushchev's visit to the Leipzig Fair on March 6 the Soviet Ambassador asked why the Soviet Minister had not been shown a model of chemical industry equipment. A Krupp director replied: "That contract has unfortunately gone to Britain. You will understand why we cannot speak about it any more."

It was also revealed in Leipzig that three British machine-tool manufacturers—the Coventry Gauge & Tool Company, Limited, Dowding & Doll, Limited, and the Newall Engineering Company, Limited, are to receive orders from Russia worth between £30,000 and £35,000 as a "goodwill gesture."

Mr. Krushchev is understood to have told businessmen at a reception on March 6 that Russia would buy machine tools, until recently under trade embargo, from the UK, West Germany, and Switzerland. He did not say how many machines would be purchased, but it is expected the orders would start with three from Britain, two from West Germany, and one from Switzerland. The Soviet Prime Minister also said he would organize an exhibition of foreign-made machinery in Moscow.

Mr. Guy Chesham, who was at the reception and who speaks for the British Machine Tool Association, said the importance of the deal was not shown by the amount of the order. The deal would be "symbolic and vital" for the industry.

Mather & Platt's Reduced Profit Margins

Wide imposition of import restrictions on machinery into India, the best export customer, had its effect and during 1958 profit margins were considerably lower than in 1957, with turnover slightly less, says Mr. L. E. Mather, chairman of Mather & Platt, Limited, electrical and textile engineers, etc., of Manchester. After a difficult year and fully aware of the problems which lie ahead, Mr. Mather says he feels the future can be faced with confidence.

A subsidiary is being formed in India to manufacture components of textile machinery and facilities are being developed for further manufacture in that country of other products of the company, he adds.

Group fixed assets have risen from £1,565,284 to £1,928,499, reflecting the policy of financing developments and modernization from own resources. At the year-end further capital commitments amounted to £225,970. Group trading profit fell from £2,054,423 to £1,435,344 and the net balance attributable to the parent from £1,063,959 to £712,022. A final dividend of 8 per cent. on a capital increased by a one-for-two scrip issue makes the equivalent of 10⅔ per cent., against 10 per cent. previously.

F. PERKINS, LIMITED—Mr. J. G. Dawson, general manager of the company's engineering division, has been appointed director of engineering and Mr. Geoffrey Smith, personal assistant to the managing director, has been appointed director of production.

Notes from the Branches

Stoke-on-Trent Section

Approximately 220 members, friends, and guests attended the second annual dinner and dance of the Stoke-on-Trent section of the Institute of British Foundrymen, held on February 20, at the Grand Hotel, Hanley. Civic guests included the Lord Mayor of Stoke-on-Trent, Ald. S. Capewell, J.P., and the Lady Mayoress and the Mayor of Newcastle-under-Lyme, Mr. W. E. Welsby, J.P., and the Mayoress. Heading a list of prominent personalities in the Institute were the national president, Mr. A. E. Peace, accompanied by Mrs. Peace, Mr. and Mrs. George Lambert, Mr. and Mrs. H. Booth, Mr. and Mrs. F. W. Nield, Mr. and Mrs. C. M. G. Wallwork, Mr. and Mrs. A. Kirkham, and Mr. and Mrs. E. H. Beech. Floral presentations were made to the Lady Mayoress of Stoke-on-Trent by Miss Gillian Smith, whilst Miss Dianne Bailey made a similar presentation to the Mayoress of Newcastle-under-Lyme. The Lancashire branch president, Mr. H. Booth, presented Mrs. A. E. Peace and Mrs. E. Smith with china figures.

Proposing the toast of "The Institute of British Foundrymen and the Stoke-on-Trent Section," the Lord Mayor stressed the importance of quality in the goods manufactured by industry and said the maintenance of quality along with economic prices depended more than ever upon increasing technical knowledge. He regretted the fact that local technical schools and colleges did not provide classes for apprentices and craftsmen in the foundry industry, but felt sure that the work being done by the Institute would eventually stimulate a demand for such classes which would then be met by the local educational authority.

In replying, Mr. A. E. Peace, outlining some of the features of the Institute's work, said that the lifeblood of the Institute came from its branches and sections, and complimented the Stoke section upon its enthusiasm and hard work.

The toast to the Guests of the evening was proposed by Mr. H. G. Charsley, section vice-president, and the Mayor of Newcastle made an exceptionally witty speech in reply, during which—as one engaged in the foundry industry—he paid further tribute to the progress made by the section. Dancing continued until 1 a.m.; the M.C. being Mr. B. Cordall.

Birmingham

At the February meeting of the Birmingham branch at the James Watt Memorial Institute, many people had to be turned away, due to the popularity of the paper entitled "Pattern-making in Plastics," presented by Mr. H. G. King, although over 200 were able to be accommodated in the meeting room. The branch president, Mr. D. Moir, welcomed the guests who came from all parts of the country, including visitors from the United Patternmakers Association. In introducing Mr. King, who is patternshop foreman at the Crewe locomotive works of British Railways, Mr. Moir said that he (Mr. King) had been developing the use of plastics in patternmaking for the past four years in the iron, steel and brass foundries at Crewe with outstanding success.

The lecturer, whose presentation was excellent, kept his audience interested throughout the evening. He commenced by briefly going over all the present conventional pattern-making materials and commenting on their advantages and disadvantages, particularly during the period of storage. He said, although there had been a tendency during the early days of plastics—due to the misapplication of the few types of plastics then available—to get the material a bad name, the position to-day was very different. Of the more recent additions

Part of the assembly at the Stoke-on-Trent section dinner, last month:

Back row: Mr. R. Lewis, Mrs. G. Lambert, Mr. K. Leyland (president, Stoke-on-Trent Engineers), Mr. J. Bailey, Mr. G. Lambert; *middle row:* Miss G. Smith, Mr. H. G. Charsley, Mr. H. Stubbs, Mrs. H. Stubbs, Mrs. K. Leyland, Mrs. J. Bailey, Mrs. A. E. Peace, Mr. A. E. Peace; *front row:* The Lord Mayor of Stoke-on-Trent (Ald. S. Capewell, J.P.), the Lady Mayoress, Mr. E. Smith (section president), Mrs. E. Smith, the Mayor of Newcastle-under-Lyme (Mr. W. Welsby), the Mayoress, and Miss D. Bailey.

Notes from the Branches

to the plastic family, the epoxy-resin type, was a very suitable material for patterns, being one of the few plastics which could be formed to a shape without mechanical pressure and high temperature, and one which was easily cast in open or closed moulds, becoming solid at normal room temperatures.

Mr. King went on to discuss the many types of patterns which had been produced at his works, and are now in daily use. The whole of this description was well illustrated by slides showing the actual manufacture and casting of these patterns, also the completed loose pattern or patternplates. The author described one moulding unit, consisting of one roll-over and one pin-lift machine serviced by a roller conveyor, which had replaced three old machines on which production had been from 800 cast-iron plates with metal patterns. He said that for the new machines, patternplates 24 by 18-in. had to be used, whereas previously plates measuring only 15 by 12-in. were employed. All foundrymen would appreciate that in such a change-over an enormous amount of patternmaking was involved.

A vote of thanks to the lecturer was proposed by Mr. Pearson who commenced by remarking on the full attendance at the lecture, and then went on to say it was evident from Mr. King's practical paper that he had used and proved a new method, with very great success. In seconding, Mr. Dunlop endorsed Mr. Pearson's comments, saying that the hour or so taken up by the lecture had passed all too quickly, and he felt sure that everyone—including those who had to stand throughout—had found it well worthwhile.

Slough

A visit to the Houses of Parliament followed by dinner at the White Bear Inn, Piccadilly, London, W.1, (concluding with a visit to the theatre), is the programme scheduled for the annual "social" of the Slough section on April 11. It is hoped that Mr. Fenner Brockway, the local Member of Parliament, will personally conduct the tour of the Palace of Westminster, and Agatha Christie's "Mouse Trap," at the Ambassador's Theatre, Cambridge Circus, has been chosen for the play. The secretary wishes it to be known that ladies will be welcome to take part in this event. The party will assemble at the Slough Social Centre, Farnham Road, at 2 p.m. (arrangements will be made for those who wish to be picked up on the way), and will arrive at the Houses of Parliament at 3.30 p.m.; dinner is scheduled for 6 p.m., and the show commences at 8 p.m. The cost per head will be 38s. 6d., and those wishing to participate are requested to advise the secretary, Mr. R. J. Bown, to this effect as early as possible before March 31. Applications should be addressed to Mr. Bown, c/o B. J. Griffin & Son, 47, Bath Road, Slough.

IN LAST WEEK'S "NOTES FROM THE BRANCHES" when reporting the Beds & Herts section dinner, several lines of "copy" were unfortunately omitted. These should have carried the information that Mr. G. A. Smith, the section president, took the chair at the function and he it was who proposed the "loyal toast" and welcomed the assembly, laying stress on the help received from many well-wishers. He also received on behalf of the section the presidential insignia of office, presented by Mr. Hobkirk. Apologies are recorded to Mr. Smith and any others who may have been confused by the omissions.

Coalbrookdale Quarter-millenium Celebrations

Plans are now nearing completion for the celebration this year of the 250th anniversary of Abraham Darby's takeover of the Coalbrookdale Ironworks, a major event in foundry history. Birmingham University is to be the centre for some commemorative lectures, and the programme will also include a one-day visit to Coalbrookdale to see the furnace used by Darby for his experiments. Another item will be an exhibition of Darby relics, which will include the original Darby accounts, which at present are part of the permanent collection at Shrewsbury Library.

Abraham Darby was born at Wrens Nest, near Dudley, in 1677, and it is two-and-a-half centuries ago that he decided to take lease of an old furnace in Salop. By that time he had considerable experience as a founder. He had worked in Bristol and had experimented with a new technique of casting iron pots. The Bristol area, however, lacked the charcoal needed for the experiments and Darby decided that Coalbrookdale was a better proposition. Round it were immense woods, coal was accessible, and not far away were the prosperous metal trades of Wolverhampton and Birmingham which gave promise of brisk business for his output. So Darby went to Shropshire and from his experiments he developed a technique which eliminated the need for charcoal, used in the smelting of iron at Coalbrookdale for many years before he took over there.

Darby was a shrewd budget controller, well ahead of his time in costing procedures, he was also a great sales manager. He sent his salesmen to all parts of Britain, and the production level of iron products from the Coalbrookdale foundry steadily mounted. Darby was not secretive about his "know-how"; he believed implicitly in pooling information and he regularly welcomed at this foundry engineers and observers to study his techniques. He was extremely inventive and the Coalbrookdale foundry record is chequered with pioneer activities. In 1709, the first cast holloware to be made in England was produced there, and in 1767 the first cast tram-rails. That now historic feat, the making of the first cast-iron bridge in the world, was carried out in 1779, and in 1802 the company made the first locomotive and carriage for railroads. When Britain staged its great 1851 Exhibition at the Crystal Palace, Coalbrookdale made a gold medal set of cast-iron gates. When Abraham Darby died the reputation of Coalbrookdale was established, and there were members of his family well equipped to carry on the work in the field of ironfounding. It was his grandson, another Abraham, who made the castings for the 1779 bridge which was built across the River Severn.

UNLESS THERE IS a marked improvement in productivity and an end to unofficial strikes the firm will ask to be released from its £8,000,000 contract for the construction of the nuclear power-station at Hunterston (Ayrshire). This warning was given on March 9 to the 500 employees of the Motherwell Bridge & Engineering Company, Limited, engaged on the work. Mr. A. R. Miller, the chairman and managing director, told the men that the company was six months behind its programme in providing the reactor and steam-raising units for the station. Over the past seven months, he said, there had been an average of one unofficial strike on the site every fortnight.

Personal

Mr. ROBERT D. BAIRD has been appointed a director of Baird & Tatlock (London), Limited, and of Hopkin & Williams.

The West Midlands branch of the Institute of Export has appointed a new chairman, Mr. P. W. UNDERHILL, who is chief shipping officer at Birlec, Limited.

Mr. J. G. MARSDEN, late of British Paints, Limited, of Newcastle-on-Tyne, has joined Anti-Dust Services, Limited, as general sales manager in charge of UK sales.

Mr. L. J. DUDDRIDGE who has been works manager of Dialoy, Limited, Colchester Avenue, Cardiff, since the formation of the company in 1946, has now been appointed a director.

Mr. R. C. WHALLEY, assistant commercial manager, Vulcan Foundry, Limited, Newton-le-Willows, Lancs, has been elected an associate of the Institution of Locomotive Engineers.

Mr. HECTOR V. SLADE, managing director of the Garrard Engineering and Manufacturing Company, Limited, has been elected chairman of the Radio and Electronic Component Manufacturers' Federation.

Mr. WILFRID L. FLETCHER, who was a special director of Dorman Long & Company, Limited, has been appointed a director. Mr. GEORGE FOSTER and Mr. ERNEST N. HIGHTON have been appointed special directors.

Mr. ERNEST ALLISON, company secretary to F. H. Lloyd & Company, Limited, is retiring at Easter after 20 years' association with the firm. He is a founder member of the Wednesbury and Darlaston Manufacturers' Association.

Mr. E. LONGDEN, M.I.MECH.E., hopes personally to present to the Victorian section of the Institute of Australian Foundrymen, at their conference in November, the British exchange paper. He has booked his passage to sail on September 23.

R. & A. Main, Limited, announce that Mr. J. WORTLEY, has been appointed deputy managing director of the company. Mr. Wortley, who was elected to the board as works director in 1958, first joined the company at their Falkirk works in 1948.

Mr. ALFRED VOCE, director and secretary of the British Steam Specialities, Limited, brassfounders, Leicester, has retired after 40 years with the company and 20 years on the board. He will be succeeded as secretary, from April 1, by Mr. B. H. COLE.

Mr. DONALD LAMBERT BROWN, 53, has been appointed deputy manager of Smiths Aviation division's research department at Cheltenham. He joins the division from the School of Gas Turbine Technology, Farnborough, where he was principal.

Laidlaw, Drew & Company, Limited, combustion engineers, of Edinburgh, announce that Mr. G. PATRICK EADIE, B.SC., who joined the company, from Newforge, Limited, of Belfast, in 1951, as chief engineer, has now been appointed to the board of directors.

Mr. W. E. NUTTING, a maintenance fitter employed by Round Oak Steel Works, Limited, Brierley Hill (Staffs), for over 30 years, is the new president of the British Iron, Steel, and Kindred Trades Association and is the first Midlander to hold that office. He is a member of the executive Council of the Iron and Steel Trades Confederation.

Mr. G. M. WARREN, sales director of the Grantham firm of Aveling-Barford, Limited, machinery and equipment manufacturers, etc., is visiting subsidiary companies in Canada and Venezuela and also customers in Mexico, Panama, and Trinidad. Exports by the company to Canada and South America have greatly increased since the war.

Mr. F. M. INGLIS, education and safety officer with Siemens Edison Swan, Limited, Sunderland, has been appointed to a similar post with Stewarts and Lloyds, Limited, at Corby (Northants). Mr. Inglis' successor as chairman of the Sunderland and District Industrial Safety Group is Mr. F. W. WATT, of the Tyne & Wear Electrical Company.

In July, Birmingham University is to confer the honorary degree of Doctor of Law upon Mr. J. J. GRACIE, who is a director of the General Electric Company, Limited, and general manager of the GEC engineering works at Witton, Birmingham. He is also chairman of the Governors of the Birmingham College of Advanced Technology, a member of the Birmingham Chamber of Commerce and of the National Council for Technological Awards.

Dr. J. A. BERRIMAN has been appointed general manager at the Carrington Works, Manchester, of Petrochemicals, Limited. He succeeds Mr. W. E. HUGGETT, who has held the position since 1955 when the company became an associate of the Shell Chemical Company, Limited. Mr. Huggett has resigned and accepted an appointment with Constructors John Brown, Limited. Dr. Berriman joined Shell as a technologist in 1940. In July, 1955, he was appointed director (refining division) and deputy to the managing director of the Shell Refining Company, a position he has held until his present appointment.

Mr. W. ROGER CLAYTON, sales director of C. T. Skelton & Company, Limited, tool and garden-implement makers, Sheafbank Works, Sheffield, sailed on March 14 in the S.S. Parthia for New York on the first stage of a four-and-a-half month overseas tour. He is visiting the company's agents in America, Canada, the Pacific Islands, New Zealand, Australia and South Africa. He will fly from Perth to Johannesburg and spend six weeks in South Africa before leaving for this country where he expects to arrive at Southampton in July. Mr. Clayton has just finished his year as chairman of the Edge Tool Manufacturers' Association.

Obituary

Mr. WALTER F. T. MANVELL, who died recently, was home trade director of C. & J. Hampton, Limited, the Sheffield engineers and toolmakers, etc. He was 47.

The death has occurred of Mr. W. H. G. DUROSE, a special director of Vickers-Armstrongs (Shipbuilders), Limited, who was manager of the firm's constructional steel division at Hebburn-on-Tyne. Mr. Durose, who was 56, joined Palmers Hebburn Works 17 years ago.

The death has occurred at the age of 59 of Mr. FRED ROWARTH, executive director and sales manager of Automotive Products Company, Limited, Borg & Beck Company, Limited, motor component makers, Lockheed Hydraulic Brake Company, Limited, all of Leamington Spa, and Lockheed Precision Products, Limited, Liverpool. He became a well-known figure in the aircraft industry and was chief engineer of the aircraft and armament experimental establishment at Martlesham and later at Boscombe Down. He joined the Automotive Products Company in 1945 as general sales manager, and became executive director in January, 1956.

Company News

GENERAL REFRACTORIES, LIMITED—Group trading profit for 1958 was £888,413, against £1,156,792 in the previous year. Net profit was £303,471 (£394,060). The dividend is maintained at 20 per cent. on the £1,500,000 capital which was increased by a one-for-five rights issue of 10s. shares at 26s. 6d.

MANGANESE BRONZE & BRASS COMPANY, LIMITED—A final dividend of 8d. per 5s. share makes a total of 1s. 0½d. per share, equal to 20⅝ per cent. for 1958, against the previous equivalent of 10¼ per cent., which included a 2½ per cent. bonus. Group net profits, subject to audit, advanced from £266,634 to £328,818.

PETER BROTHERHOOD, LIMITED, engineers and ironfounders, of Peterborough—The one-for-two free scrip issue, foreshadowed last November, is proposed to be made to ordinary holders registered March 25. It will involve capitalizing the £275,000 fixed assets replacement reserve and £75,000 of the general reserve. The necessary meeting will be held on March 25.

J. & E. HALL, LIMITED, engineers and ironfounders, of Dartford, Kent (controlled by the Peninsular & Oriental Steam Navigation Company, Limited)—Increased group profits are announced of £840,678 for the year ended September 30, 1958, against £777,003, and the dividend is raised from 15 per cent. to 20 per cent. with a final of 17½ per cent. Net profit is £379,678 (£364,003).

JOHN BROWN & COMPANY, LIMITED, shipbuilders, etc., of Glasgow—A rights issue to raise £1,967,487 is announced. The issue is of 1,311,658 ordinary £1 shares at 30s. each on the basis of one for every £7 ordinary stock held on January 30. Application may also be made for excess shares. The directors expect to pay a final dividend for the year to March 31 next of 6 per cent. on the increased capital. Group trading profits for the year before tax, it is estimated, will be not more than 10 per cent. below last year's figure of £3,336,382 and after tax should not materially differ from the previous figure of £1,391,960.

EXPANDED METAL COMPANY, LIMITED—Provisional allotment letters were posted recently for the rights issue of 487,768 5s. ordinary shares at 11s. 6d. each on a one-for-five basis. Shares not taken up, if of value, will be sold and the net premium remitted to entitled stockholders. The year has started with an order-book twice the value of a year ago, but it is impossible to forecast far ahead, the directors state. They hope, however, to recommend for 1959 on the increased ordinary total dividends of 17 per cent. Guinness Mahon & Company has agreed to subscribe for any shares not taken up or sold for a fee of £5,450, out of which it will pay the expenses of the issue, including Stock Exchange and brokers' fees and a sub-underwriting commission of 1½d. per share, but excluding the company's legal expenses.

Nuclear Power-station to have Research Centre

A research centre is to be established by the Central Electricity Generating Board adjacent to its Berkeley (Glos) nuclear power-station. It will be used to investigate operational techniques and any problems that may arise in the running of Britain's first commercial atomic power-stations.

The research installation will comprise engineering, physics, metallurgy, and chemistry laboratories, costing in all about £1,000,000.

New Catalogues

Foundry Plant Export. Consolidated Foundry Plant, Limited, Hanover Court, Hanover Street, London, W.1, have issued a leaflet for overseas buyers, detailing the wide range of foundry equipment handled by the group and showing how this plant is employed to provide a complete foundry layout. The consortium, it will be remembered, is a joint exporting group formed by Acme Conveyors, Limited; Paterson Hughes Engineering Company, Limited; Coleman Wallwork Company, Limited; the Incandescent Heat group of companies; and Tilghmans, Limited, and between them a very extensive range of plant is made available. The five illustrations in the folder show one piece of equipment from each of the five companies, which by assembly give evidence that the requirements of a fully-integrated foundry plant are well covered.

Heated Molten-iron Receivers. A four-page leaflet received from the Monometer Manufacturing Company, Limited, Savoy House, 115-116, Strand, London, W.C.2, carries, on the back page, a good technical description of the fixed and mobile receivers the company manufactures. A two-page centre-spread shows excellent photographs of installations of hot-metal receivers at Federated Foundries, Limited, and the Thames Foundry of the Ford Motor Company, Limited. In the reviewer's opinion, the appearance of the front page, which also has a picture of the Ford installation, is marred by heavy vertical green strips which detract from the illustration.

Non-ferrous Castings. Charles Carr, Limited, Grove Lane, Smethwick 40, have issued a six-page folder which is *multum in parva* for within a small compass, space has been found to deal with non-ferrous castings; spun-cast cored bar; chill-cast solid or cored bar; Monel-metal castings and non-sparking tools. In addition the brochure is generously illustrated. Its limitations are, however, recognized, as is indicated by the enclosing of a pre-paid postcard offering full-length catalogues dealing with the various aspects.

Steel Castinugs. The most recent folder to be received from K. & L. Steelfounders and Engineers, Limited, Letchworth, Herts, covers the valuable properties to be expected from well-made gear-blanks produced as steel castings, and explains why, made this way, they are better than forged or rolled material.

Recent Wills

PITT, EDWIN, managing director of Loxdale Foundry, Limited, Bilston (Staffs) £43,700

EDWARDS, T. O., works engineer at the Swindon Works, near Dudley (Worcs), of Richard Thomas & Baldwins, Limited £5,649

SUTCLIFFE, LEWIS, who served with Robert Dempster & Sons, Limited, gas and general engineers, etc., of Elland (Yorks), for 41 years £1,003

JACKSON, JOHN, retired engineer and founder of the Sterling Manufacturing Company, precision engineers, etc., of Bradford (Yorks) £8,367

KAYE, J. R., a former office manager of John Shaw & Sons (Honley), Limited, manufacturers of ruling and perforating machinery, of Honley, Huddersfield (Yorks) £6,464

MORRIS, THOMAS, founder and former managing director of Morris Springs, Limited, Wolverhampton, and a former joint managing director and one of the founders of the West Bromwich Spring Company, Limited £14,539

INTESTATE

DAVIE, H. S., foreman engineer with Wm Doxford & Sons, Limited, the Sunderland engineers and shipbuilders £1,992

News in Brief

WILD-BARFIELD ELECTRIC FURNACES, LIMITED, of Watford, announce a reduction in price in the United Kingdom, of their patented Carbodrip gas-carburizing fluid.

LARGEST OF ITS KIND in the country, a new 600-lb. vacuum induction-melting furnace has begun operating at William Jessop & Sons, Limited, Sheffield. It will be used for high-quality steel, titanium, and other metals.

EXPLOITATION of an important manganese deposit, said to be 1,400,000 tons in extent, at Grand-Lahou, French Ivory Coast, has been started by the Mokta-el-Hadid ore-mining company. Output is likely to be 100,000 tons annually.

BROOKHIRST IGRANIC, LIMITED, the electrical subsidiary of the Metal Industries group, has secured an order worth more than £150,000 for equipment for the Central Electricity Generating Board's Skelton Grange "B" power-station at Leeds.

FIRTH-VICKERS STAINLESS STEELS, LIMITED, and Shepcote Rolling Mills, Limited, held their staff dance at the Cutlers' Hall, Sheffield, on March 13. Among those present were Sir Frederick and Lady Pickworth, and Mr. W. D. Pugh (chairman) and Mrs. Pugh.

A JOINT SYMPOSIUM on "Instrumentation and Computation in Process Development and Plant Design" is to be held at the Central Hall, Westminster, London, S.W1, from May 11 to 13. Details are available from the Institution of Chemical Engineers, 16, Belgrave Square, London, S.W.1.

THE THIRTEENTH CHEMICAL ENGINEERING EXHIBITION CONGRESS (ACHEMA), will take place in the city of Frankfurt exhibition grounds from June 9 to 17. Floor space available will be the same as that for the 1958 congress and this year attempts are being made to concentrate attention on new developments.

SLACKNESS IN MOST of the shiprepairing yards and some slight redundancy among shipbuilding trades raised unemployment figures among Tyne shipyard workers last month to the highest level since December, 1950, with 1,830 men and women out of employment. This was an increase of 356 on the January figure.

WINNING SLOGAN—"Don't Court Danger—She's Engaged to Death"—in a competition run by the Sheffield Area Industrial Group of the Royal Society for the Prevention of Accidents was submitted by Grahame Eyre, a 17-year-old apprentice at the Steel, Peech & Tozer branch of the United Steel Companies, Limited.

DAWSON BROS., LIMITED, bottlers' engineers, Dewsbury Road, Gomersal, near Leeds, have secured an order, worth nearly £20,000, from the Polish Government's purchasing organization, Polimex. It is for eight machines to be used by the Polish food industry, which will wash, de-label and sterilize up to 4,000 jars per hour.

THE ANNUAL STAFF DINNER/dance of the Sheepbridge Company, Limited, at the Station Hotel, Chesterfield, was attended by 180 people. Among those present were Mr. S. W. Martin, chairman and managing director, directors, Mr. S. N. Turner, Mr. H. C. Hanna and Mr. E. Marvill, and Mr. D. W. Sinclair (secretary).

HATTERSLEY BROS., LIMITED, Queen's Foundry, Swinton, Mexborough, Yorks, the week before last held their annual dinner of the firm's Sports Club. Amongst those present were Mr. N. W. D. Yardley, former England and Yorkshire Cricket captain, and Mr. F. Young, the chairman and managing director of the company.

THE SIX-FOOT-TALL COATS OF ARMS of the Cutlers' Company, surmounting the Cutlers' Hall in Sheffield, have been painted for the first time in the history of the 127-year-old building. This was done on the initiative of the Master Cutler, Mr. J. Hugh Neill, as was also the floodlighting of the front of the building for the 323rd Cutlers' Feast, on March 17.

THE BRITISH CAST IRON RESEARCH ASSOCIATION announces that a course on "Sand Control" will be held at Alvechurch from April 7 to 10 inclusive. Attendance will be limited to a maximum of 12, and applications will be dealt with in rotation. Should, however, the number of applications exceed 12, a further course or courses will be held after a short interval.

MACHINERY AND EQUIPMENT for two pumping stations for the latest extension to Liverpool Corporation waterworks comprise a contract worth £298,309 awarded to W. H. Allen Sons & Company, Limited, Bedford. The extension is the river Dee supply portion of the Tryweryn scheme. In addition to the pumps the contract includes the installation of motors, switchgear, etc.

DISMANTLING OF the Central Electricity Board's old Bankside station, London, S.E.1, which finally closes down on March 24, was begun on March 9 by the George Cohen 600 Group, Limited. The plant includes 18 large boilers, nine turbo-alternator sets, and much ancillary equipment. The demolition will also yield large quantities of non-ferrous metal, cast iron, and steel scrap.

LAST WEEK at the Arundel Street works of Kitchen & Wade, Limited, machine-tool makers, Halifax, a 19-year-old apprentice fitter, Mr. E. McGowan was involved in a most unusual accident. He was making adjustments with a spanner to a chip-crushing machine, when the spanner slipped from his hand, and in falling he started the machine in motion. As a result he received a badly lacerated foot.

THE BRITISH INSTITUTE OF MANAGEMENT announces the holding of a Northern Management Conference, to cover various aspects of sales, at the Prince of Wales Hotel, Southport, on April 2 and 3. The chairman of one session is to be Mr. J. L. Hepworth of Hepworth & Grandage, Limited. Details of the meeting are available from the conference secretary, British Institute of Management, 80, Fetter Lane, London, E.C.4.

THE MASTER CUTLER, Mr. Hugh Neill, told members of the Sheffield branch of the Chartered Institute of Secretaries at their annual dinner, on March 13, that a 15 to 20 per cent. saving in administrative staff could be made by careful pruning of paper work by most firms. Mr. T. H. Tunn, Sheffield Director of Education, said that Sheffield was engaged in building one of the biggest technical colleges in the country on "one of the worst sites in the world."

ASHMORE, BENSON, PEASE & COMPANY announce that a licence arrangement has recently been concluded with the Mond Nickel Company, Limited, by which the company is now in a position to supply s.-g. or high-ductile iron castings in accordance with British Standard Specification 2789/1956. Under the new arrangements Ashmore's will be able to supply castings in these irons in weights up to 25 tons in floor, loam, machine-moulded and CO_2-moulded castings.

JANUARY WAS ONE of the busiest months engineers of the National Industrial Fuel Efficiency Service have experienced. In addition to the work carried out for industry and commercial fuel users, 137 firms con-

News in Brief

suming over 250,000 tons of fuel were contacted for the first time about the possibility of investigating their fuel usage. The number of surveys completed since April 1, 1957, rose to 469, compared with 371 surveys completed at the same time last year. In the field of regular service the increase has been even more substantial. Agreements are now in operation with 683 firms, compared with 514 a year ago.

A DEVELOPMENT from the plant-performance recorder, the ideas for which were published by the British Iron and Steel Research Association only two years ago, is now being built in Battersea for instalment in a giant tyre-factory in Russia. The factory is to be built by a consortium of British firms and the monitoring equipment is now being made by the Digital Engineering Company, Limited, of 136, Battersea Park Road, London, S.W.11. Some of the actual equipment for the Russian factory will be shown on the stand of the Department of Scientific & Industrial Research at the Factory Equipment Exhibition at Earls Court on April 7-17.

THE BRITISH RADIO AND ELECTRONIC COMPONENTS SHOW, organized by the Radio and Electronic Component Manufacturers' Federation, is to be held at Grosvenor House Hotel, London, W.1, from April 6 to 9 inclusive. Amongst the exhibitors will be K.L.G. Sparking Plugs, Limited, whose main theme will be the use of ceramics in the field of atomic energy. The centrepiece of their display, on stand No. 142, will be one of the capacitors, used in large numbers for Zeta, and other exhibits include thermal discs of Hylumina ceramics—used in fuel cans where uranium rods are assembled—and a range of terminals designed for capacitors when used out of doors.

AN ORDER WORTH £1,250,000 has been placed with Babcock & Wilcox, Limited, Renfrew, by Elektrum, the Polish Government purchasing agency, for two pulverized-coal-fired boilers for the Lagisza power station. Each boiler will supply 830,000 lb. of steam per hr. (at a pressure of 1,917 lb. per sq. in., and a temperature of 1,010 deg. F.) to drive a 120,000-kw. electrical generator. The contract sum includes technical aid fees for the components of the installation which will be manufactured locally to Babcock & Wilcox designs, but the major part of the contract price covers material to be supplied from Great Britain such as the drums, other pressure parts, coal-pulverizing mills, valves, and control equipment.

A CONFERENCE on the sources and uses of information for those in the steel and steel-using industries is to be held in the Sheffield Library Theatre on April 23. It has been organized by the British Iron and Steel Research Association, British Steel Castings Research Association, Sheffield Chamber of Commerce and the British Iron and Steel Federation under the direction of the Sheffield Library. Mr. Cecil Hurst, deputy chairman and director of Samuel Osborn & Company, Limited, and Mr. G. Parkin, local director of Mappin & Webb, Limited, will speak on the value of information to the large and medium-size firm. Mr. M. Pearl, librarian and information officer to the British Iron and Steel Institute, will speak on the sources of technical information, and Dr. E. Brewin, intelligence officer of the British Iron and Steel Federation, on sources of commercial information. Mr. J. Bebbington, Sheffield City Librarian, will deal with national and other sources of information. Mr. W. D. Pugh, managing director of English Steel Corporation, Limited, Sheffield, will preside at the conference.

News from Africa

Risco's Rebate Scheme

The Rhodesian Iron and Steel Company is to grant an export rebate of £2 a ton to manufacturers in the Federation who use Risco steel and export the finished product. The rebate, payable on proof of export, represents a saving of 5 per cent. to the manufacturer. Agricultural implements are being sold to neighbouring territories and it is hoped that the move will stimulate export of other steel products. The aims behind the rebate are stimulation of the export of federal steel and increased sales for Risco at a time when the credit squeeze and a slowing-down in the rate of development has cut production. "The move," said Mr. E. S. Newson, Risco's deputy chairman, "is in line with our policy of taking active steps to avoid retrenchment or short-time working." The fall off in demand for steel—the principal outlet is structural steel for the building industry—has forced the company to consider closing its second blast furnace, but it has been decided, instead, to continue to stockpile pig-iron. At the same time the company is looking for export outlets in what is a highly competitive market. Pig-iron which is exported is likely to "necessitate some financial sacrifice." Risco could produce about 80,000 tons of steel annually but present figures are well short of this total.

New Foundry in Que Que

City Engineering & Carron, Limited, of Pretoria, South Africa, have bought a 13½-acre site in Que Que to establish a factory for porcelain enamelled baths and basins, cast-iron sanitary-ware, pipes and fittings. The new foundry is within 12 miles of the steelworks of the Rhodesian Iron and Steel Company, Limited, where pig-iron and a wide range of steel sections are produced from iron and limestone deposits, which are found side by side. It is expected that the foundry will be in production this year.

The announcement of the establishment of this new plant for the town was made just as the adjacent wireworks of Lancashire Steel Corporation came into production. In these works a £500,000 rolling mill is to be installed, and Mr. R. P. Gaunt, chairman of Lancashire Steel (Rhodesia) (Pvt.), Limited, has recently returned to Rhodesia from a visit to the UK where he has been making the final arrangements for this latest type of rolling mill. Work on the erection of the mill is expected to commence in July.

Wiggins Gasholder for Liquid Methane Imports

In connection with the experiment of importing liquid methane across the Atlantic, a 100,000 cub. ft. Wiggins dry seal gasholder has recently been completed for the North Thames Gas Board by Ashmore, Benson, Pease & Company, a member of the Power-Gas group.

The Wiggins holder will store the gaseous bleed-off from liquid methane storage tanks, an application for which its ability to operate at sub-zero temperatures makes it particularly suitable. Since 1950, orders for nearly 70 Wiggins dry seal gasholders have been received by the company.

FOUNDRY MECHANISATIONS (BAILLOT), LIMITED, Bletchley (Bucks), announce they have appointed MacGregor & Moir, specialists in engineering plant and machinery, 152, London Road, Glasgow, C.1, as their agents for the sale of their equipment in Scotland.

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Raw Material Markets

Iron and Steel

The trading position at the ironfoundries shows no appreciable change, and production of castings is maintained at recent levels. Some of the light foundries continue to benefit by the increased demand for domestic utensils, but other light foundries are very short of work, although it is hoped that better weather will bring about an upsurge in the call for builders' castings. Most of the jobbing foundries are in need of more work and business is quiet at the textile foundries.

The motor-car industry continues to indent for appreciable tonnages of high-duty castings; these demands are not so heavy as they were, but they do enable the engineering and speciality foundries catering for them to obtain reasonably good outputs. Some other trades, including heavy engineering, power and electrical plant manufacturers, machine tool and agricultural implement makers, steelworks, etc., are combining to provide the foundries with fairly good order-books.

From the machine-tool makers there is no general improvement in the demand for castings, but some of the foundries connected with them report some improvement.

The foundries have no difficulty in securing the pig-irons of their choice. On account of this and the uncertainties surrounding trade prospects and also prices, very little forward buying is being done. Stocks at the furnaces are thus increasing and in most grades of pig-iron appreciable quantities are held by producers. Some makers of the low-phosphorous iron, which continues to be called for by the engineering and speciality foundries in good quantities, are able to dispose of the major portion of their makes, but in other grades, particularly high-phosphorous foundry iron, present demands fall below outputs. Hematite makers have tonnages to spare, and refined iron makers could undertake much more business.

Foundries are fairly well supplied with scrap, which is expected to become more plentiful now that the grades which can be exported are confined to bundled scrap and turnings and borings. There is a good demand for heavy cast iron and machinery scrap. Foundry coke deliveries are satisfactory, while supplies of ganister, limestone, and firebricks are adequate.

Very little, if any, improvement is shown in business at the re-rollers. Orders for small bars and light sections from home users and stockists are scarce; during the last week or so, in fact, the position seems to have worsened. Many of the mills are finding it difficult to keep going even at the present reduced rate of working and, in consequence, their requirements of steel semis are very moderate. Although a number of inquiries continue to be received from abroad, orders are extremely difficult to obtain in the face of the severe competition and low prices quoted by foreign producers. Home steelworks could step up considerably the tonnages of steel semis now being delivered to the re-rollers.

Non-ferrous Metals

Demand for copper continues strong in the United States despite the advance in prices. At the beginning of this week the US custom smelters were quoting 32 cents a pound, the quotation having been advanced from 31 cents in two quick upward adjustments of ½ cent per pound each. This rise followed the tightening of supplies of scrap, the price of which was increased to 26½ cents a pound. This meant there was a spread of 2 cents between the custom smelters' and the producers' price. But, as expected, the gap was too wide for the producers to countenance and their price was raised in one large jump of 1½ cents a pound, equivalent to £12 a ton, bringing their quotation to 31½ cents a pound. Meanwhile, copper dealers in the US were offering the red metal at 33 cents and this price became the official custom smelters' price on Wednesday of last week after they had taken the unprecedented step of withdrawing from the market the previous day.

The position in America is that demand is strong, stocks are not too high, and there are labour troubles both potential and actual. Actual labour troubles exist in Arizona and in Chile, while the fear of tough labour negotiations for the renewal of the miners' contracts in June has prompted buying as a hedge against a future shortage. The London quotation has been dragged upwards by the situation in the US, with demand far from matching the sharp upward movement in the price. Indeed, stocks are still rising and there are strong doubts that the present price levels are soundly based. If, as is surmised, that much of the US buying is as a hedge against future interruptions of supplies, any slackening of demand would quickly be reflected in a downward trend of the UK quotation.

Tin is less steady than previously. With the special stock liquidated and export quotas being allowed to rise, the feeling is that the price will be held steady to encourage the liquidation of the buffer pool stocks. The undertone is vulnerable and prices are reacting sharply to any marked changes in demand. In any event, consumer demand remains satisfactory on both sides of the Atlantic and in the East, although much of the urgency prompting recent consumer buying has disappeared. The US price is around $1.03 a pound.

Lead is weak both in London and in New York, where the price is being held at 11½ cents a pound. In London the quotation has fallen below £70 a ton. The outlook remains uncheerful.

Zinc is experiencing active trading conditions, with buyers predominating. However, small selling still upsets the market and the undertone is weak. The US price is 11 cents a pound.

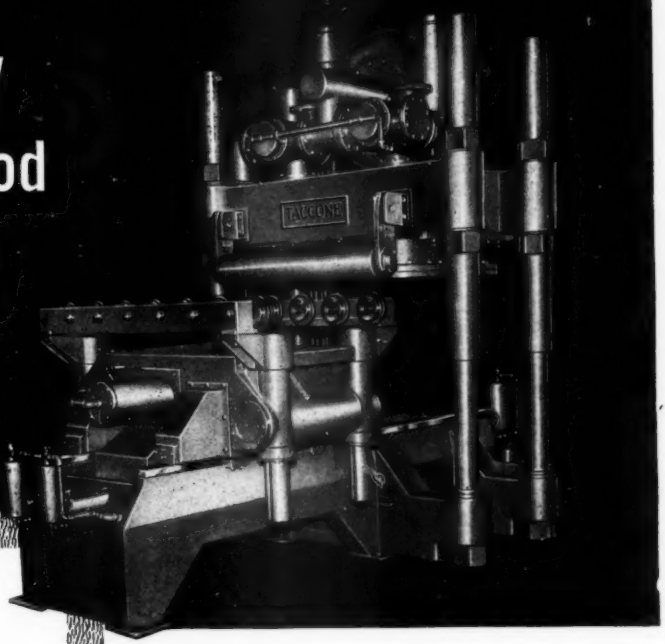
National Insurance Contributions

People whose employment has been temporarily suspended are to be excused from paying a national insurance contribution for a week of unemployment which includes a short customary holiday for which not more than 40s. holiday pay is received. This is the effect of provisional regulations* made by Mr. John Boyd-Carpenter, Minister of Pensions and National Insurance, which operate from March 23. The National Insurance Advisory Committee are considering similar draft regulations: this provision has been made pending receipt of their Report so that it can operate over the Easter holidays.

*The National Insurance (Contributions) Amendment Provisional Regulations, 1959, S.I. 1959, No. 373, obtainable from HM Stationery Office or through any bookseller, price 3d.

IT IS REGRETTED that in the article on "Foundry Exhibits in the Science Museum" appearing on pages 304 and 305 of last week's JOURNAL, no credit was given for the illustrations. Acknowledgment should have been made to "Science and Civilization in China," Vol. 6, by Joseph Needham with the collaboration of Wang Ling, Cambridge University Press.

An entirely NEW method of Foundry Moulding



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The 'Taccone' machine makes precision green sand pressure moulding available to every foundry. It ensures sound, accurate castings and the moulds it produces are superior to those made by conventional equipment. 'Taccone' moulds are consistently hard and uniform throughout and can be effortlessly produced by unskilled labour

All types of pattern equipment, including plaster wooden, plastic and metal patterns can be used, and there is practically no limitation on the size of flask employed. 'Taccone' machines are handling flasks 8½t. by 8ft. (larger sizes are envisaged) and already over 200 'Taccone' installations are in operation.

The dimensional accuracy and finish on the castings is comparable with work produced by shell moulding techniques.

The 'Taccone' is more than a machine, more than a process—it is a revolutionary system for rapid mould production.

Ten standard machines are available in the manufacturing range and special machines can be built to any size for any purpose.

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

March 18, 1959

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £23 17s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £24 1s. 3d.

Scotch Iron.—No. 3 foundry, £25 3s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 19s. 0d.; South Zone, £26 1s. 6d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £27 6s. 6d.; South Zone, £27 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.: N.-E. of England (local iron), £25 6s. 6d.; Scotland (Scotch iron), Zone S.1, £25 13s. 0d.; Sheffield, £26 15s. 0d.; Birmingham, £27 4s. 0d.; Wales (Welsh iron), £25 6s. 6d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £41 0s. 0d. to £43 10s. 0d., scale 15s. 0d. per unit; 75 per cent. Si, £56 10s. 0d. to £60 10s. 0d., scale 15s. 0d. to 16s. 0d. per unit.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 7s. 11d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 10s. 11d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7¼d. to 1s. 10¼d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £255 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/72 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (home).—78 per cent., £69 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., £32 15s. 6d.; tested, 0.08 to 0.33 per cent. C, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), £34 17s. 0d.; silico-manganese, £43 16s. 6d.; free-cutting, £36 14s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

* Average 68-70 per cent.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in. and flats 5 in. wide and under, untested soft basic, 50 tons and over, £40 0s. 6d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, £39 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £44 16s. 0d.; black sheets (hand mill), 24g., £58 14s. 6d.; galvanized corrugated sheets, 24g., £67 10s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 11s. 0d.; nickel-chrome-molybdenum, £111 19s. 0d.

NON-FERROUS METALS

Copper.—Cash, £254 10s. 0d. to £255 0s. 0d.; three months, £252 0s. 0d. to £252 5s. 0d.; settlement, £255 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 5d. per lb.; rods, 272s. 0d. per cwt. basis; 20 s.w.g., 307s. 0d. per cwt.

Tin.—Cash, £781 10s. 0d. to £782 0s. 0d.; three months, £784 10s. 0d. to £785 10s 0d.; settlement, £782 0s. 0d.

Lead (Refined Pig).—Second half March, £69 5s. 0d. to £69 10s. 0d.; second half June, £74 2s. 6d. to £74 5s. 0d.

Zinc.—Second half March, £75 2s. 6d. to £75 5s. 0d.; second half June, £74 2s. 6d. to £74 5s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £110 10s. 0d.; rolled zinc (boiler plates), all English destinations, £108 5s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £95 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 11½d. per lb.; sheets to 10 w.g., 208s. 6d. per cwt.; wire, 2s. 9d.; rolled metal, 208s. 6d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £164; B6 (85/15), £210.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £205; HTB2 (38 tons), — ; HTB3 (48 tons), £230.

Gunmetal.—BS1400, LG2 (85/5/5/5), £205; LG3 (86/7/5/2), £211; G1 (88/10/2/½), £272; (88/10/2/1), £260.

Phosphor Bronze.—BS1400, PB1 (AID released), £302 per ton.

Leaded Phosphor Bronze.—BS1400, LPB1 (1060), £222 per ton.

Phosphor Bronze Strip, etc.—Strip, 303s. 3d. per cwt.; wire, 4s. 2⅝d. per lb.; rods, 3s. 5⅜d.; tubes, 3s. 5¾d.; chill cast bars: solids 3s. 5¼d.; cored 3s. 6¼d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 11d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 4d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 3d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £74 0s. 0d. to £75 0s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £246, AB2, £254.